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# Contractors and Engineers Monthly

Vol. 44, No. 7 · JULY, 1947 · $3 a Year, 25 Cents a Copy


## Covering the Field

**• Bituminous Paving**
A large asphalt plant and special equipment keep progress steady as a sand-asphalt plant-mix is laid for 33 miles. See page 1.

**• Grade Separation**
For job details on building a 4-lane overpass to carry traffic over railroad tracks, read the story on this page.

**• Safety in Construction**
What job accidents do to your direct and indirect costs is analyzed on this page.
Safety practices followed in building the Brooklyn-Battery underwater tunnel receive a thorough going over on page 38.

**• Fast Concrete Paving**
A 6.7-mile job so mechanized that not even form pins were driven by hand is covered in an article on page 6, and in a picture story on pages 48 and 49.

**• Airport Construction**
Sheepsfoot, steel flat-wheel, and pneumatic-tire rollers were moved in to compact subgrade and sub-base for concrete runways at a new airport. See page 17.

**• Dam Project Starts**
Active Clark Hill Dam contracts for an access RR, diversion channel, earth embankments, etc., are described on page 25.

**• Blasting New Road**
Widening and rebuilding almost 8 miles through mountains called for heavy excavation, 98 per cent rock (page 33).

**• Soil Compaction**
Page 43 summarizes a two-day conference sponsored by the ARBA on methods and equipment for soil compaction, with a report on vibratory compaction machines.

**• Handling Rubberized Asphalt**
Pointers on handling rubber-asphalt joint sealers are noted on page 52. Heating to controlled optimum temperature largely determines performance.

**• Highway Maintenance**
One district goes in for long-wearing patches plus plenty of heavy equipment in order to keep its maintenance low in cost and high in quality. See page 56.

**• Dredging Ship Canal**
Two dredges dig an access canal to a berthing area for surplus U. S. merchant vessels. The account appears on page 61.

**• Roadside Development**
Roadside weed control with 2-4D receives a favorable report on page 66.
Page 88 has something to say on control of right-of-way, highway access, and the use of adjacent areas in designing and constructing safe modern roads.

**• County Road Work**
Without state or Federal aid, but given a green light by public vote, a county paved 100 new miles by contract in one year. The story is told on page 69.

**• Sand-Clay Road Base**
A low-cost improvement is made possible by taking advantage of local materials. Thorough mixing of base materials characterizes the job reported on page 75.


*(You will find "In This Issue" on page 4)*

*C. & E. M. Photo*
**In the carpenter yard on the Reeves & Sons overpass job, a rip saw driven by a Le Roi engine cuts form studs.**

# Railroad Overpass On By-Pass Highway

## Two Railroad Tracks Are Crossed by Modernistic Concrete Structure; Use Air-Entrained Concrete

✦ A FOUR-LANE reinforced-concrete overpass 801 feet long was recently built to carry through traffic on a new by-pass route around the city of Austin, Texas. The $246,000 job was done for the Texas State Highway Department by F. M. Reeves & Sons, contractor of Austin, Texas.

The new structure carries traffic over the MKT and Southern Pacific railroad tracks at the east edge of the city. It is divided along the center line by a 1-inch open joint in the slab, with a 4-inch parabolic rise on a 24-inch transition at each roadway center. This monolithic dividing island keeps two lanes of traffic on each of the 26-foot roadways. Two 5-foot sidewalks with ornamental pipe


*(Continued on page 12)*


# Plant-Mix Surfacing Renews Old Highway

By WILLIAM H. QUIRK,
Eastern Editor

## A Large Asphalt Plant and Special Equipment Co-Star As Sand-Asphalt Mix Is Laid for 33 Miles

✦ AN asphalt plant with a 2½-ton pugmill and a capacity of 150 tons per hour starred on a road-widening and resurfacing contract in western Florida last winter. Co-starred on the 33-mile project was special equipment for laying and rolling the sand-asphalt plant-mix used both in the widening lanes and surfacing. The road improvement was not a continuous stretch, but covered several different sections where the old pavement needed renewal.

The original $323,153.40 contract was awarded to the Smith Engineering & Construction Co. of Pensacola, Fla., by the Florida State Road Department. It included two sections along U. S. 98, the Gulf Coast Highway. One 5.1-mile section was located in Okaloosa County, while the other in Bay County was 16.7 miles long.

Additional work was later awarded in the general vicinity to the same contractor at the rate of $3.62 per ton of plant-mix laid in place. These four other supplemental pieces totaled 11.2 miles. They included three sections on U. S. 98: 2.0 miles more in Okaloosa County, 4.3 miles in Walton County, and 3.5 miles in Santa Rosa County. The fourth additional section, 1.4 miles long, is on State Route 20, also in Okaloosa County. The opposite ends of the work were about 75 miles apart.

The supplemental work called for surfacing only, but the Bay County section in the original contract included widening from 20 to 24 feet. It was done by filling a 2-foot-wide trench dug along each edge of the highway with a 1-foot depth of sand-asphalt plant-mix. The new surface consisted of two courses of the same material laid by finishing machines. Wherever the old road was broken up and uneven, a leveling course of the plant-mix preceded the widening and machine paving. Motor graders were used to spread the leveling course, filling in the holes and depressions in the road profile.

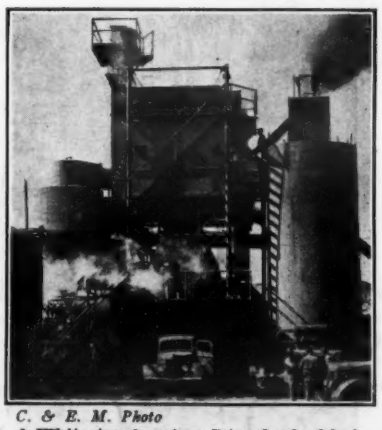
### Asphalt Plant

A Simplicity asphalt plant was set up along the west side of State Route 79 about ½ mile north of its intersection with U. S. 98, and 15 miles west of Panama City. At this point an abundant deposit of acceptable sand was available for the mix. Two Caterpillar D8 tractors pulling LeTourneau Model LP 15-yard scrapers worked the area in big circles, bringing the sand to one side of the pit. There it was stockpiled against a wooden barricade, 100 feet long x 10 feet high, constructed of 2 x 8's nailed horizontally to 8 x 8 posts set on 24-foot centers. A D8 tractor-dozer pushed the sand to an opening in the fence where two feeding hogs, 18 inches wide x 6 feet long, had been installed.

The feeders carried the sand along to a 20-foot-high cold elevator. There it was raised to a single-shell drier, 29 feet long x 6 feet in diameter. After passing through this drier, the sand dropped to the foot of a 20-foot hot elevator where it was raised to another paralleling drier, a dual-shell unit 27 feet long x 8 feet 6 inches in diameter. The sand made a complete round trip in this drier before being discharged into the main hot elevator, 54 feet high.

Each drier was heated by a Ray oil burner. Each was equipped with a fan and dust collector set up along the side, and having a capacity of 5 tons. Two International UD-18 engines were located at one end of the driers. One


*(Continued on page 83)*

*C. & E. M. Photo*
**A White truck gets a 7-ton load of hot-mix from a Simplicity plant for the Smith resurfacing job. The large tank at the left is for asphalt storage; the 105-ton-capacity silo at the right is for lime-dust storage.**

# Construction-Accident Costs Will Be $630,000,000 in 1947

By WALTER J. BYRNE, Consulting Engineer, New York City

## Only Planning for Job Safety as Well as Efficiency Can Reduce This Unnecessary Expense to the Industry

✦ PLANNED construction volume in 1947 is so great that the construction industry must gear itself for the greatest peacetime effort in history. But one retarding factor lies in the current high construction costs. At a time when prospective investors, both public and private, are cost-conscious, perhaps it is opportune to focus attention on the non-productive dollar costs which result from accidents during construction work.

Accident prevention has long been stressed in the wrong way—as though it were an extraneous element in the planning and work of a contractor. But an activity whose omission has a $600,000,000-a-year share in construction costs should not be dismissed as extraneous. Nor is that share in costs inevitable.

Why are construction accidents so costly? Usually their most obvious results are injuries to workers. But physical suffering, compensation, and medical payments are not the whole story. Without minimizing these factors, there are also other very important uneconomical effects—for which someone must pay. Let us review what we know to be facts concerning construction-accident costs.


*(Continued on page 15)*

## Soil Conservation

A couple of Caterpillar tractors with scrapers build ponds near Brookville, Kans., under the Soil Conservation Program. Shown at left on a 75-foot haul, a D8 and D7 move 400 yards of material in an hour, working 8 to 10 hours a day. At right (in inset) is Erlin P. Schweitzer, Osborne, Kans., their owner. Mr. Schweitzer uses these two Caterpillar diesels plus a D2 and D4 to do general contract work and custom farming.

## Block Lining

*Bureau of Reclamation Photo*

Precast concrete blocks are used to line a small lateral canal on the Roza Division of the Yakima Irrigation Project in eastern Washington. The Bureau of Reclamation hopes this lower-cost type of lining will be adaptable to farmers' ditches; it can be placed by unskilled labor without special equipment, and block units can be mass-produced at a central location.

## Roll Welding

This photograph shows a good example of the technique of roll welding. A block and fall is rigged at each end of this 6-inch pipe line being welded. By unwinding, the pipe is turned. This allows the welder to work in a flat or downhand position, increasing his speed and assuring sound welds. The weld is being made with Airco 78E all-position electrodes.

## Tire Testing

Here's where these giant earth-mover tires designed and made by The Goodyear Tire & Rubber Co. get the works on the proving ground. Goodyear says these tires, built specially for construction equipment, will handle heavy loads at low cost and give maximum flotation and long wear.

## Supervising by Air

*North American Aviation Photos*

Contractors Donald MacIsaac and Arthur Menke (left photo) discuss a flight from their Los Angeles office to one of their construction jobs at Overton, Nev. Fifty-two-year-old MacIsaac felt he was getting too old to drive fast over highways on widely scattered inspection trips, but not too old to learn to fly. He learned, and Menke did, too. They bought a NAvion plane. At right, MacIsaac arrives on the job.

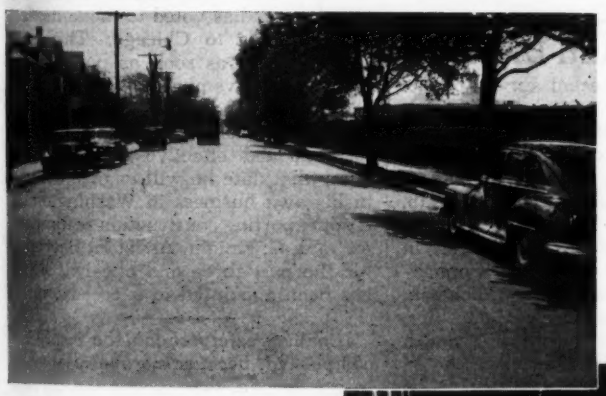
# 21 years under heavy Trenton, N. J., traffic

## Maintenance: $.02 to $.03 per square yard per year

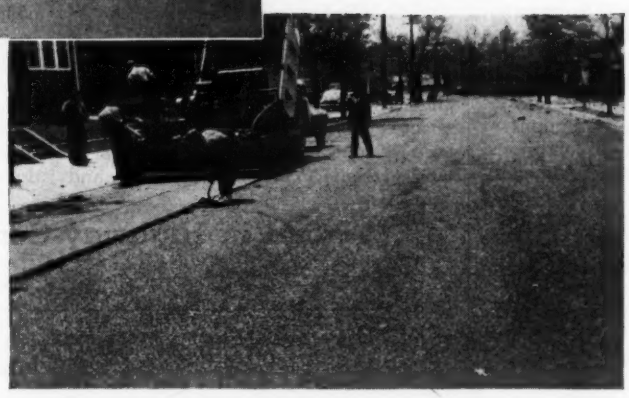
21-year-old Texaco Asphalt pavement on Broad Street, Trenton. Upkeep cost has been $.023 per square yard per year.

21-year-old Texaco Asphalt pavement on Willow Street, Trenton. Upkeep cost has been $.03 per square yard per year.

### TRENTON'S YARDAGE OF TEXACO CONTINUES TO GROW!



Texaco Sheet Asphalt on Hamilton Avenue. Laid in 1946 by the Union Paving Company, Philadelphia.



Paving Brunswick Avenue with Texaco in 1947. Contractor: A. E. Barrett, Trenton.

On two of the busiest streets of Trenton, capital of New Jersey, Texaco Asphalt paving again has proven its ability to take heavy punishment for years with a minimum of maintenance. The pavements shown above are typical of many others laid on Trenton streets 20 to 25 years ago.

Little wonder that 1,500 representative U. S. cities have paved substantial yardages of their streets with resilient, durable Texaco Asphalt.

Among the country's largest cities (with population over 25,000), three out of four have paved with Texaco during the past 40 years.

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THE TEXAS COMPANY, *Asphalt Sales Dept.*, 135 East 42nd St., New York City 17

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TEXACO REG. T. M.

# TEXACO ASPHALT

# Contractors and Engineers Monthly

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**For the Highway and Heavy-Construction Industry**
Member of Controlled Circulation Audit

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# Our New Roads—Toll or Free?

Once again the question of free or toll roads confronts highway engineers and the traveling public. And arguments pro and con wax vehement. Because the issue is basic in the development of our highway system, it is well to review it and the reasons for the recent increased interest in collecting tolls.

Obviously the rising cost of road construction and the urgent need for more improved highways have turned the thought of many people towards tolls as a source of funds. Because, in many sections of the country, it appears that new road facilities are far in the future, it is fallaciously assumed that tolls will bring us those new highways *now*.

The publicity given to such toll roads as the Pennsylvania Turnpike and the Merritt Parkway in Connecticut has increased interest in such projects and approval of them by many who are not acquainted with all the facts and factors involved. A recent article in the *Saturday Evening Post* entitled "No Relief for the Motorist" sets forth in effective fashion our "dismal traffic problems". It also suggests that only the politicians object to solving that problem by means of toll roads. But there are two important factors which this article does not mention.

One is that of time. The years required to construct expressways through our densely populated and industrial areas result in great measure from the long slow process of right-of-way acquisition through the planning and design stage to actual construction. This lapse of time is unavoidable, regardless of the source of the funds.

The other oversight in this article which makes so strong a plea for toll roads is the matter of diversion of gas-tax and other motor-vehicle revenues. From 1925 to 1942, the per cent of highway-user revenue diverted to non-highway purposes rose from 1.8 to 15.5. During the war years, of course, there was less diversion, but there is no guarantee in many states that it will not be increased again in the future. A fairly typical example of this misuse of highway funds was the recent proposal in Georgia that drivers' license fees for the next five years be used to finance a new veterinary school at the University of Georgia.

It would seem that the first logical step in securing sufficient funds for our much needed highway program should be the use of *all* gas-tax and motor-vehicle revenues for highway purposes. The next step is to be sure that that money is used as effectively and economically as possible in a well-planned program in the hands of competent conscientious engineers. Let's get rid of politics-ridden highway departments, whose programs are determined by the vote-getting capacity of a new road location and whose funds are raided regularly for more "popular" purposes.

Both diversion and the political chicanery in some highway departments are public problems, and must be solved by the public. Everyone wants good roads—there's no disagreement about that. We believe the public will support a rational, honest, sound program to secure good roads—even at an increased gas tax—once it understands the factors involved. At present, most people don't, and they are being baited by a false picture of "superhighways" easily and quickly obtainable by means of tolls.

In a recent statement on the subject of toll roads vs. free roads, Thomas H. MacDonald, Commissioner of Public Roads, pointed out an interesting fact. The generally accepted toll rate of one cent a mile for passenger cars is equivalent to a gasoline tax of from 12 to 16 cents a gallon. Yet in many states where an increase of as little as 2 cents a gallon has been proposed, there has been a great hue and cry. In most of those states, the gasoline-tax increase has been proposed to make possible an orderly planned highway program in accordance with the need—the result of which would benefit all highway users well into the foreseeable future.

There are other factors to be considered in the decision to build toll roads instead of free highways. It must be remembered that the Pennsylvania Turnpike—most often pointed to as the outstanding example of a successful toll road—received a very substantial Federal grant to make possible its construction. This was an outright gift. Only in very special cases, where terrain, existing transportation facilities (or lack of them), and the amount of heavy traffic create unusual conditions, is a toll road justified or economically feasible. Testifying before a legislative finance committee in Connecticut, State Highway Commissioner William J. Cox stated that the Merritt Parkway, handling more than 18,000 vehicles a day, still does not collect enough tolls to pay for itself. "Tolls, though they may have their places, are not the general answer to improving the highway system", he said.

As a general policy, charging motorists to use one section of the highway system defeats the primary objective of improvement to the system as a whole. It is obvious that a toll road must be an additional facility. A free road must also be available to those who don't wish to pay or can't pay the tolls, as well as to serve the local short-haul traffic for which an expressway is not designed. At best, then, as Commissioner of Public Roads MacDonald has pointed out, a toll road affords only a partial, and usually an expensive and communally unsatisfactory, solution to the traffic problem in the area. It is a partial solution because it serves only a portion of the traffic along its line. It is communally unsatisfactory because it requires, for its economic protection, a depression of the standard of improvement of alternate free roads. As soon as those free roads are improved to the point required for the safety and efficiency of the traffic which must use them, use of the toll road will diminish and it will operate at a loss.

The real obstacle to realizing our plans for a speedily improved highway system lies not only in the rising costs of materials and labor, but also in the shortages and uncertainties in delivery of materials, lack of trained engineering personnel, and public ignorance of all these problems. It is hardly rational to suggest that toll-road authorities can secure more of these materials and services more economically than can public highway officials. No—the problem is first to get the maximum mileage of improved highways with the funds now available; then to increase those funds as necessary to continue a balanced well planned overall program of free highways to meet our traffic needs.

Greater cooperation between engineers and contractors to insure the most economical investment of the highway dollar; legislation to simplify and speed up the acquisition of land for highway use; further mechanization of highway building to lower construction costs; a settlement of labor-management problems; assurance of steady production of the materials and equipment needed for highway construction; well trained conscientious engineers, free of political domination, in our highway departments; careful planning and selection of the most economical materials available for road building; and the good old American system of free competitive enterprise: these—not tolls—will set us well on our way towards our goal of a modern highway system, safe, efficient, and free.

## Gas-Tax Increases And Anti-Diversion

According to a recent survey by the National Highway Users Conference, gasoline-tax increases were proposed in 31 states. They were defeated in Arkansas, Delaware, Indiana, Montana, New Mexico, North Dakota, Utah, Washington, West Virginia, and Wyoming. Increases still are pending in Alabama, Florida, California, Connecticut, Illinois, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, and Wisconsin.

Temporary gasoline taxes in New York were made permanent and extensions have been enacted in Idaho, Ohio, and West Virginia. Four states have enacted gasoline-tax increases: Colorado (2 cents), Maine (2 cents), Maryland (1 cent), Vermont (½ cent), and Nevada (1½ cents). The last state has made proceeds payable to counties which may decline to levy the tax by adoption of resolution.

Anti-diversion constitutional-amendment resolutions have been considered by 12 states. The Tennessee Legislature gave approval to such a resolution for the second time, and it is now ready for submission to the voters. Amendments were defeated in Arkansas, Delaware, Indiana, Maryland, New Mexico, and Utah. Proposals are pending in Connecticut, Florida, Illinois, Massachusetts, and Rhode Island.

Statistics for 1946 show that special state highway-user taxes paid for highway purposes reached an all-time high of nearly $1,616,000,000. This is 29.1 per cent over 1945 and 11.2 per cent over 1941, the previous high year.

## AED Moves to Chicago; Knight New Secretary

As a result of a poll of its membership which showed a preference for a midwest location, the Board of Directors of the Associated Equipment Distributors has voted to move its executive offices to Chicago. The move will be made as soon as possible, not later than November 1.

Carol Winchester, Executive Secretary for the past six and one-half years, has resigned effective September 30. After that date he will engage actively in his own business in Washington, D. C., of exporting construction equipment.

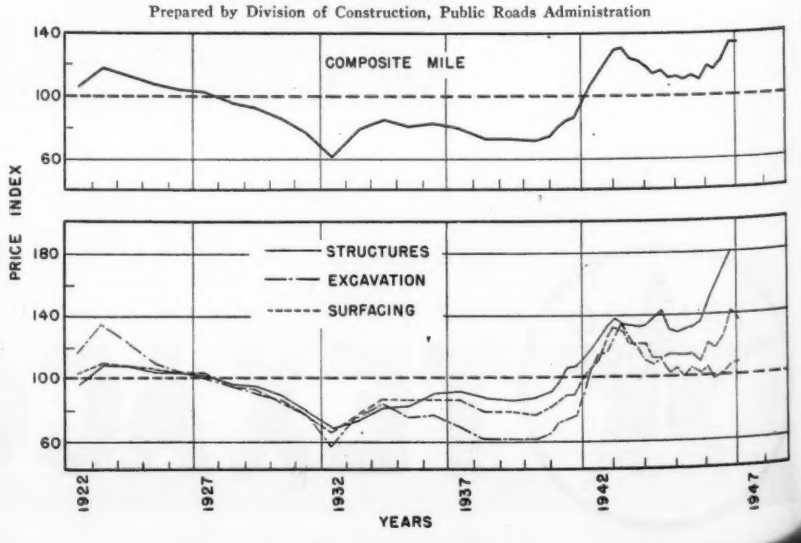
Frank G. Knight, Assistant Secretary for the past three and one-half years, has been appointed to succeed him.

*Highway safety should be easily accomplished, because no one is opposed to it. No one, that is, but the careless selfish people who leave accident prevention up to the other fellow. Safety requires the cooperation of all of us, so let's follow that admonition "Drive as if your life depended on it—because it does."*

## Trend in Highway-Construction Costs

(Averages for 1925 to 1929 taken as base)

Prepared by Division of Construction, Public Roads Administration



The SEAMAN mixing sand and bitumen. Sand, because of moisture content had earlier resisted proper curing of mix. The SEAMAN'S characteristic of aeration eliminates such difficulties. Note the footprints which illustrate fluffy, well-aerated mix.

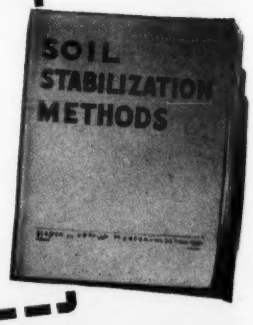
# For a Better, Faster Curing Bituminous Treatment . . . Aerate Solvents or Moisture *While You Mix* with the

# SEAMAN *Mixer*

Hood open operation to reduce high moisture content in aggregate.

THE HIGH VELOCITY, all-directional movement of aggregates and binder within the hood of the SEAMAN MIXER is one reason why an intimate and thoroughly homogenous mix is quickly produced. But there's also another vitally important advantage: *aeration* . . . Should the aggregate be running a bit too high in moisture, – the SEAMAN will often save a shut-down, for it dries as it mixes . . . And it's that same simultaneous aeration that helps to evaporate solvents in certain bituminous mixes so that, – after the mix is completed, a faster, firmer set is obtained . . . Many operators have found the SEAMAN invaluable for use in conjunction with mixing plants of conventional design, for the SEAMAN can often double daily output. Again, – that vital factor of drying by aeration, keeps the conventional plant in operation when moisture content of aggregates might otherwise have meant a shut-down . . . So for your regular mixing – and for emergencies, – have the SEAMAN on your jobs.

*The ever-popular book "Soil Stabilization Methods", compiled by Seaman engineers is yours on request. Just ask for Bulletin E-25.*




**SEAMAN MOTORS, INC.**

MILWAUKEE 3, WISCONSIN

# Paving Crew Pours 3,200 Feet In One Run on Highball Route

## Red-Hot Road Builders Push Two Concrete Lanes At High Speed to Plug Missing Link in U.S. 99

By RAYMOND P. DAY
Western Editor

(*Photos on pages 48 and 49*)

✦ AS fast as you read this sentence, a powerful highway machine will crawl another foot forward to make U. S. 99 a four-lane road from Mexico to Canada.

This highway machine is potent. It is not some newly manufactured masterpiece; rather, it is a development of the past. It is composed of brains, brawn, and various pieces of road-building equipment. It is known as Griffith Co., of Los Angeles, and make no mistake about its being a great road-building machine.

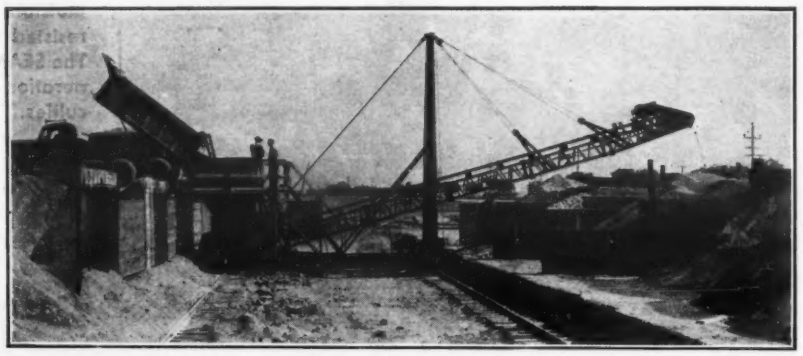
Unleashed 12 miles north of Bakersfield, Calif., last November 4, it ripped a roadbed true as a die for 6.7 miles, smashed it tight, blended sand and asphalt for a seal cushion, and with unchecked impetus is now pouring a concrete slab—the contractor's collodion dressing—to seal the wounded earth.

It is all part of a $515,000 short-time contract with the California Department of Public Works, designed to make heavily traveled Route 99 a four-lane divided road for another 6.7 miles, thus closing more of the gap where this great north-south highway has only two traffic lanes. The state highway departments of California, Oregon, and Washington are pushing as hard as the contractors to increase 99's traffic capacity, from border to border, to four lanes.

By July 31 this year the Griffith Co. will have completed its present contract, and another 6.7 miles through new right-of-way will be a reality. Not only is the sheer power of the Griffith machine stunning; certain aspects of the job are also new and interesting even to experienced highway builders.

It is a job with 21,600 linear feet of steel forms, all of which are in use every day. It is a job where those

(*Continued on next page*)



## Batch Plant Uses Special Shop-Built Mobile Rig To Stack Sand and Rock in Reach of Loading Crane

✦ A ROLLING aggregate stacker, basically nothing more than a steel hopper, conveyor boom, and propelling machinery, was used to profitable advantage by Griffith Co. on its $515,000 concrete-paving contract north of Bakersfield, Calif.

Designed and built in the Los Angeles yard of Griffith Co., the movable conveyor embodies two principles of material handling proved sound over the years; first, that the conveyor belt is a low-cost method of transporting sand and rock; and second, that repairs and replacement of parts are normally less expensive when using a conveyor system than when using the conventional tractor-mounted bulldozer between the truck dump and the clamshell pick-up points.

Having certain Cedarapids crushing equipment on its inventory, Griffith Co. built its conveyor system around Cedarapids dimensions so it could be interchanged between machines if desired. A welded-steel frame, strong and stiff enough to carry the bin and auxiliary equipment, was first equipped with steel wheels at all four corners, to give a wheelbase of 26 feet 6 inches. An 8-yard steel hopper was mounted on one side of the contrivance, to receive sand and aggregate from trucks.

Gates at the base of this hopper opened out to let the material fall onto the 60-foot-long rubber conveyor belt, 30 inches wide. The conveyor boom was made movable, up or down, by means of hoist cables leading up over the apex of an A-frame and down to a small electrically operated hoist drum.

Propelling motors, conveyor power, and hoist motors all received their 440-volt alternating current from a Caterpillar D4600 diesel electric generating set, mounted below the feeder hopper. A single steel railroad rail centered on 8 x 8 ties below each wheel set completed the stacker. It was built in prefabricated sections, so that it might be disassembled and moved from job to job.

When it was hauled out by trailer to the Bakersfield project, a crew of four mechanics made the set-up in two 8-working-hour shifts, using nothing more powerful than a small truck crane. Unassembled, the biggest part of the stacker is the 8-yard bin.

### Procedure in Stacking

White dump trucks, hauling 7 cubic yards to each load, transported sand and rock for this project from a commercial washing plant operated by Griffith Co. in the Kern River Valley, about 12 miles from the job. Each truck backed up onto an earth ramp to discharge its cargo to the stacker bin. Four sizes of material were being used in this mix, so four compartments separated by 3 x 8-inch timbers were provided along the stacker rails.

Previous to this paving project there have been provisions in aggregate specifications to prevent any mixing of sizes, and to guard against the mixing of any dirt in the clean rock. This, however, was very nearly impossible to control perfectly when a large-size bulldozer was used, and resident engineers objected ever more strenuously as time went by. The shop-built stacker is the Griffith Co. answer to the problem, and it has seemed to solve all past difficulties. It very effectively takes

(*Concluded on page 93*)

## Concrete Saw Rips Slots For Contraction Joints After Concrete Hardens On New Highway Project

✦ CONVENTIONAL forming methods on contraction-joint grooves were dispensed with on a 2-mile section of the Griffith Co. paving contract. With special permission of the California Division of Highways, contraction-joint slots were cut by Concut Jr. mechanical concrete saws, after the slab had hardened. The work was done by Clean-Cut Co. of Bell, Calif., under a subcontract with Griffith Co.

At 15-foot intervals a line was drawn across the slab with the aid of a straight-edge. Starting approximately in the center of the strip, the cutting disk of a Concut machine was lowered 2 inches deep in the slab by the machine operator. Cutting then progressed to the outer edge of the slab, after which the machine was turned around and the groove cut to the opposite side.

The Concut Jr. machine uses a circular blade coated with abrasive; it is powered by a Wisconsin gasoline engine. As the blade revolves at high speed, water feeding down on the cutting disk dispels the heat generated in the cutting operation.

Under supervision of Clean-Cut's Steve Hatcher, two machines were used, with one machine standing by in case of a breakdown. By sawing the slots in pavement not more than 24 hours old, progress as rapid as one 12-foot joint in four minutes' time was made. With harder concrete, however, speed was lost and there was much greater wear on the ⅛-inch disks.

The slots were washed clean of cutting dust with a water jet, dried, and filled with liquid asphalt even with the top of the slab.

When the bumpometer was used over these contraction joints, no bump appeared. Formed contraction joints, on the other hand, showed definite irregularity with the slab, according to the operator who checked both types.

According to the consensus among interested state and contractor's representatives, a contraction joint cut by this new experimental method is smoother, has a straighter line, uniform thickness, and width. Because it goes in at right angles to the slab surface, there seems to be a good chance of the contraction crack going on through the slab on that same plane. The cost of these joints was somewhat higher than that of conventional formed ones, however, and replacement of worn disks somewhat of a problem.

**At left, two men set tie bolts for the keyed longitudinal contact joint on the Griffith Co. job. At center, a Lima 801 clamshell transfers sand from storage piles to the sand bin of the contractor's Conveyco batch plant. At right, a truck discharges to the rolling aggregate stacker developed for the job. In the foreground is Batch Plant Superintendent Walt Cody.**

*C. & E. M. Photos*

*C. & E. M. Photo*
**Workmen pull form pins along the finished slab near Bakersfield, Calif., so that a Shrader electromagnet on an Insley truck crane can pick up nearly a mile of steel forms to be moved ahead.**

# Paving Crew Pours 3,200 Feet in a Run

*(Continued from preceding page)*

forms are reloaded easily, after stripping, by a Shrader electromagnet. It is a job which saw developed a special aggregate stacker at the batch plant, to meet more economically the tough state specifications which prohibit any mixing of different sizes of rock and sand. It is a job so highly mechanized that even the form pins are not driven by hand any more. It is a job that saw a 3,200-foot pour on one 12-foot lane in an 8-hour run. Every out-of-the-way fact hits even a hardened road builder with the impact of a hickory club.

The new slab is 23 feet wide with a 5-foot shoulder on the inside and an 8-foot shoulder on the outside. It will parallel the present asphalt highway, separated by an earth dividing strip. New right-of-way for Griffith's job was purchased largely in level, friable agricultural country, where the action of ground water on a fine soil considerably influenced the design.

A Caterpillar No. 12 motor grader sliced the roadway to survey blue-tops, after excavating machinery graded the brown dirt. No big effort was made at that time to get the grade more accurate than plus or minus 1 inch. A stout chalk line, carried on steel pins every 25 feet, was stretched tight at the exact elevation of the top of concrete, and a form-placing crew moved up with its equipment.

### Setting Steel Forms

A total of 21,600 feet of Blaw-Knox steel forms was assigned to the Bakersfield job. This is a more-than-average amount; however, plans called for the 23-foot 8-inch-thick pavement to be poured in two strips, one 12-foot and one 11-foot lane, with a keyed, doweled longitudinal joint along the edge of the first poured lane. Two sets of forms 8 inches thick were therefore needed for the first lane, with only one set on the second lane.

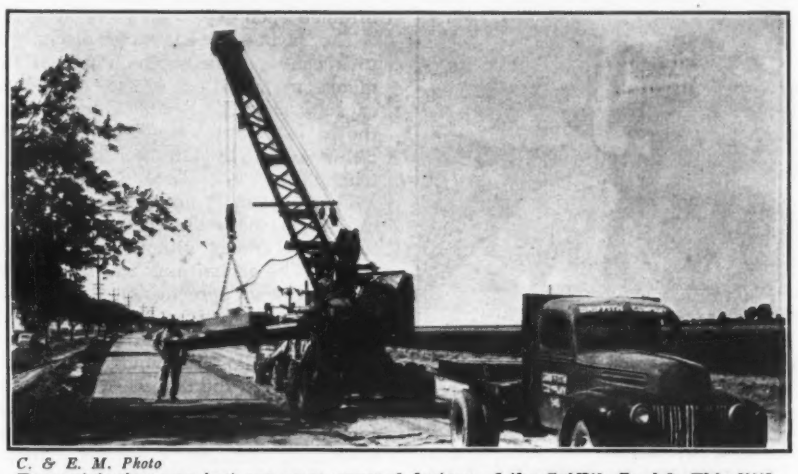
Form setting, geared to high speed on an assembly-line basis, seemed to set the pace for all the other rapid-fire operations that followed on this job. Three men walking beside a flat-bed truck unloaded the steel forms, stringing them along as they passed. When a truck was unloaded, these three men took shovels and fine-graded the form-base contact by hand. Since the passage of the motor grader some time previously had left this ground reasonably close to grade, it was a fast-moving operation.

Two men, burly and tough, with heavy prizefighter shoulder muscles, grabbed each form and set it in place, interlocking the joints between each unit. Another husky individual followed rapidly with a sledge hammer. He tapped a form one way here, another way there, to make its alignment conform to the string line. He also picked up and barely set a steel pin in each of the keyed wells along the Blaw-Knox forms.

Griffith Co. used mechanical power to drive these pins through the subgrade. Where six men would have been needed here to keep up with pins, one man with an Ingersoll-Rand pneumatic gun slammed them in at high speed. He used a Schramm compressor, mounted on an old Chevrolet truck, with enough rubber air hose to let him work quite a few pins without moving the truck ahead.

And while three drivings by sledge hammer usually broom a form pin so that it has to be re-dressed, the Ingersoll-Rand gun drove them as many as ten times with no sign of brooming. In addition to the economy of this method, it was much faster and safer, according to the man who handled the driving.

"Not much chance of a sliver puttin' a man's eye out this way," he commented.



*C. & E. M. Photo*
**Form stripping was just one more unusual feature of the Griffith Co. job. This little Insley truck crane makes short work of the task by using a Shrader electromagnet to lift them onto a flat-bed truck. Mechanization reduced the size of the crew needed.**

The base of the forms was not covered immediately. That operation was left to a motor grader later on. But the forms were oiled by a shop-made sprayer designed to work at high speed. One man handled it. The rig was mounted on a wheelbarrow frame, with

*(Continued on next page)*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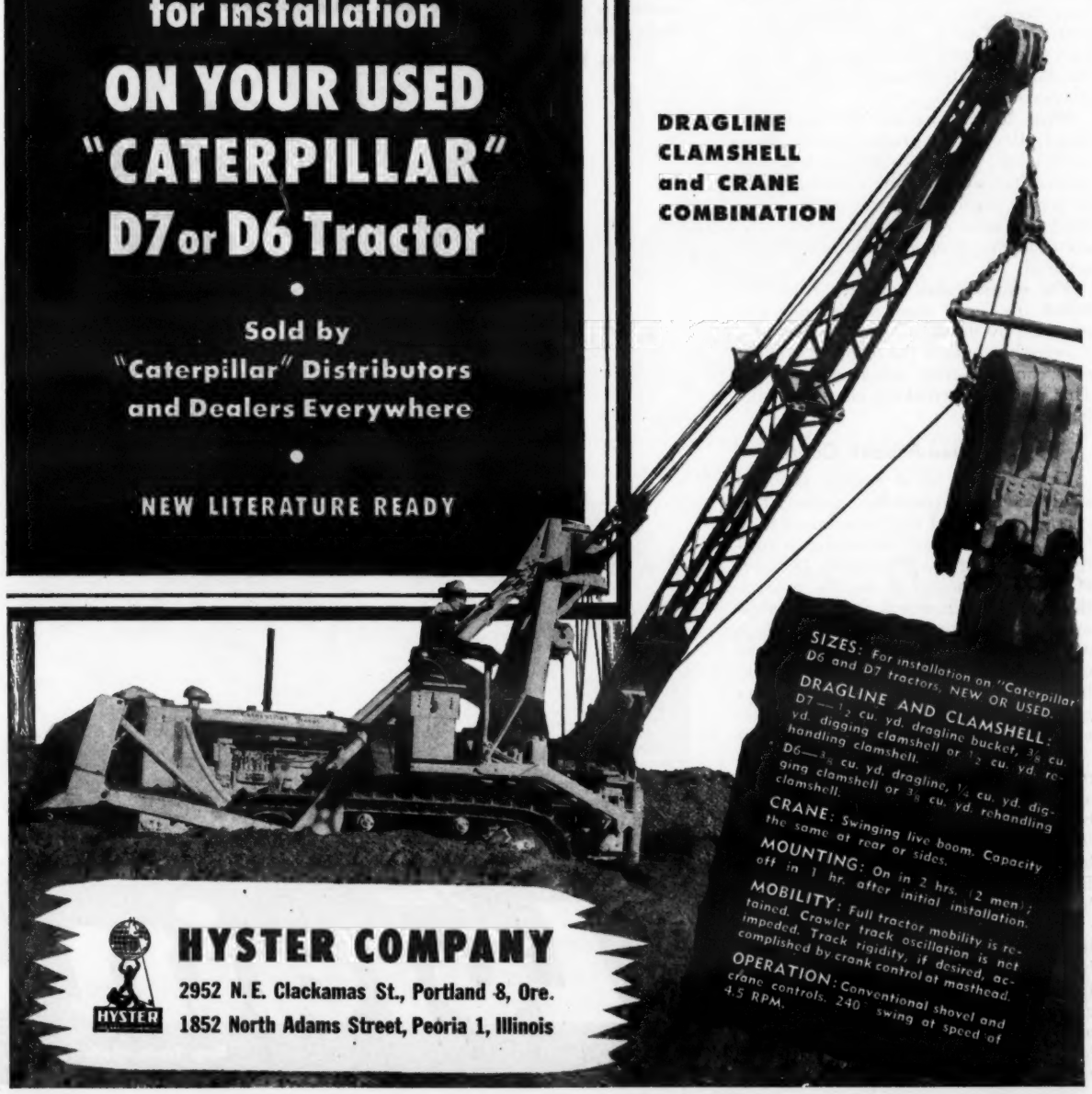

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*C. & E. M. Photo*

**Superintendent for Griffith Co. on the U. S. 99 paving project was S. F. Immel. He is shown here smiling and satisfied over some of the finished pavement.**

# Paving Crew Pours 3,200 Feet in a Run

*(Continued from preceding page)*

a small pneumatic wheelbarrow tire carrying the load. The spray reservoir consisted of a steel tank 36 inches long x 12 inches in diameter, on top of which was mounted a bicycle-tire pump. A mixture of diesel fuel and engine oil was put in this reservoir, the hole plugged, and pressure pumped up. A standard orchard-spray nozzle, with valve control at the dispensing end, was then handled by one man who easily kept up with the form-setting crew.

### Fine-Grading

A Lewis mechanical subgrader, assisted at times by a Caterpillar No. 12 motor grader, took out 3 inches of subgrade soil below the level of the steel form base. Drawn by a 6-wheel-drive truck, the Lewis subgrader picked up excess earth and discharged it outside the forms by its system of rubber-belt conveyors.

When tough subgrade was found, the Caterpillar motor grader ripped those spots loose. A shop-made grading shoe guided its blade in planing the subgrade to proper depth. By lowering the blade until this shoe rode on top of the concrete forms, proper blade depth was assured.

The excess earth removed from between the forms was knocked down in one pass by the motor grader; part of it covered the base of the forms to prevent any concrete from sticking later on. This dirt also carried the concrete-mixing traffic.

### Special Sand-Asphalt Course

Three inches of a special asphalt-sand cushion, carefully mixed and spread, was one of the important design features of the job. According to representatives of the California Division of Highways assigned to the project, this blanket course will prevent pumping of the subgrade caused by surface water penetrating the pavement cracks and softening the untreated material below. And it will also act as a cushion between the concrete slab and the dirt subgrade.

Griffith Co. set up an asphalt-mixing plant to batch this material in accordance with state specifications. A Barber-Greene bucket loader was used to take the sand from the stockpile. This loader discharged to the hopper of a Barber-Greene asphalt mixer, set in line and adjacent to the loader.

RC-3 cut-back asphalt was hauled in hot by trucks and tank trailers, and blended with sand in the Barber-Greene mixer at the rate of 5 per cent asphalt by weight. About 25 tons of asphalt was used here each day, and the output of the plant was generally geared to the use of a tank truck and trailer of bitumen each day.

The Barber-Greene mixer discharged to a conveyor belt, which passed the mixed material on up to a 20-ton-capacity steel hopper. Sliding gates at the bottom of this single-compartment bin were used to load the fish-tail batch trucks.

The short haul, never more than 3¾ miles, was made by a fleet of four 10-ton dump trucks without covering the loads. The asphalt mix was dumped to a Griffith-built spreader box, which laid the material down about ¾ inch above the base of the steel road forms. A ponderous Buffalo-Springfield three-axle tandem roller, the last word in modern smooth-wheel compacting units, then smashed the material down to the form base line, making a smooth, dense, asphalt-impregnated cushion on which the slab would rest.

Grade was re-checked at this point, using the same string-line method the fine-grading crew used behind its machine. A string was stretched tight over the top of the forms, and the distance measured to the top of the cushion. With no variable thickness in the concrete-slab design, this distance was checked at 8 inches all the way across between the Blaw-Knox forms.

On one exceptional day, when the cushion had to be pushed ahead 3,000 feet to keep apace with the paving crew, 318 cubic yards of this mix was laid down and processed from 7:30 a.m. to 3 that afternoon.

### Set Center-Joint Pins

No expansion joints went into this job, but the plans called for a keyed longitudinal contact joint. The keyway in the middle of this joint was formed by a steel protuberance, tack-welded to the side of the Blaw-Knox steel form. Holes ¾ inch in diameter, spaced on 30-inch centers, were provided to take the threaded ends of ⅝-inch tie bolts. These holes were down 4 inches from the surface of the slab.

Two men set these bolts in place. The threaded end was inserted through the keyway hole. The other end was slotted in the fastening of a steel chair, and steel pins were driven in each chair to anchor this device to the asphalt cushion. After the first lane was poured and its forms stripped, the other half of the dowel was fastened onto the threads left protruding from the keyway by means of a hexagonal threaded coupler.

### Placing the Concrete

Dry batches of sand, aggregate, and cement proportioned by automatic scales were taken to the pouring site and mixed by a Koehring Twinbatch 34-E paver. This huge machine with automatic timing, automatic water control, with mechanical brains for all the problems of a concrete pour, was spotted on the right half of the road for the first pour and on the right shoulder for the second.

Into its insatiable maw, a half dozen White batch trucks took turns dumping their 1⅓-cubic-yard slugs of precision-weighed cement, sand, and aggregate.

*(Continued on next page)*


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# Paving Crew Pours 3,200 Feet in a Run

(*Continued from preceding page*)

Each time the big skip went up in the air, a bucket of mixed concrete rolled out on the 30-foot steel boom in the rear of the machine, to slither down in place between the forms. And when the skip thumped down on the ground again with a bang, an alert spotter, long with Griffith Co., was already giving the signals to back another batch truck in to dump another drum-full.

Clear, pure mixing water was hauled about 3 miles from an irrigation well by a big White truck, carrying a 3,200-gallon tank on its bed. Its load was transferred to a 3,000-gallon trailer, pulled along behind the paver. A 3-inch Gorman-Rupp centrifugal pump, set on this trailer, pulled the water out of the hauling truck. A water pump on the Koehring paver supplied water to each batch, and at precise 40-second intervals a batch of concrete was ready to dump. It slid down out of the dual-gate bucket at an average slump consistency of about 2 inches, measured in a 12-inch cone.

As each bucket dumped, a workman picked up a little of the concrete and shoveled it under the tie bolts, so there would be no chance of voids under this important part of the slab. He carried this hand operation perhaps 10 feet ahead of the dump at all times, timing his work to keep out of the way of the heavy bucket moving on the paver boom.

A Jaeger spreader tackled the dumped concrete right behind the paver bucket, spreading the mix with a screw-type feeder bar and giving the slab its first strike-off. Two Jaeger-Lakewood finishers then followed each other in rapid succession, beating any large stones down into the slab and wiping the surface with horizontal screeds to meet the top elevation of the forms.

One of the unusual features of the job was the mechanical sawing of contraction joints in the surface after the slab hardened (see companion article on page 6). Where this method was not used, for one reason or another, the contraction joints were formed on 15-foot intervals by sinking a ⅛ x 2-inch bar in the wet mix behind the Jaeger-Lakewood machines.

The final mechanical surfacing was then done by a Johnson float finisher, which swept the slab surface lengthwise. Any excess laitance brought off by this machine was dumped and removed later.

The slab edges were dressed by hand, and wherever contraction joints were formed they received the same treatment. One finisher with a long-handled joiner tool put the final top over the contraction joints. A broomed finish was put on the slab itself, and a bump cutter was used to smooth out any overlooked irregularities after the concrete took on its initial set.

The concrete was sprayed with Hunt Process light-gray pigmented cure to form an airtight, watertight, impervious membrane over the surface of the slab. This new gray cure which reduces glare was developed specially by the Hunt Process Co. at the request of the California Division of Highways. This was the first job to use it.

### Unusual Form Stripping

One day after each pour, the forms on that previous day's run were picked up and moved ahead, regardless of the distance. The removal of steel forms, in which a crane-handled electromagnet saw action, was one of the fastest and most efficient parts of this fast-moving project.

The form pins were lifted by the lever action of pin pullers; two men were usually sufficient to keep the steel pins removed far enough ahead of the crane. A crowbar was also used to break the forms loose from the concrete.

The 10-foot steel sections were then picked up rapidly and easily and loaded on a flat-bed truck by a Shrader electromagnet, mounted on a small truck crane. A small Delco generator set furnished the moderate-voltage high-amperage current to operate the magnet. The magnetic attraction was ample to lift the forms, one at a time, with contact only along one edge. Two men straightened the forms on the bed of the truck after the crane operator dropped them by flicking a switch.

Pin pullers continued to operate when the loaded truck went on ahead to dump its forms at the far end of the job. Simply by dropping the magnet from its load hook, and disconnecting the power line to the generator, the truck crane could be used at a moment's notice for other, conventional truck-crane work.

(*Concluded on next page, Col. 2*)

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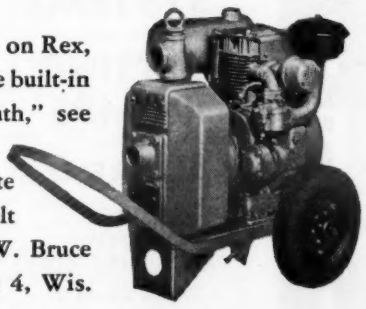

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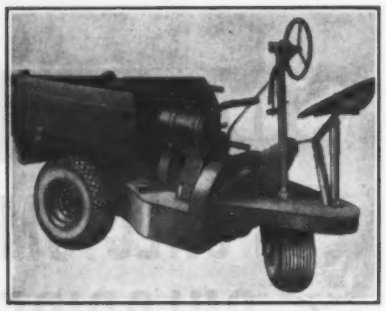

The Novo Scootruk can carry a one-ton load of concrete, sand, etc. at 15 mph. Its 1,000-pound weight, empty, makes it applicable to scaffold work. Its airplane-type tires permit it to travel without special roadways.

## Powered Wheelbarrow Has Speeds to 15 MPH

A mechanized wheelbarrow capable of carrying one-ton loads at speeds up to 15 mph is now in production. The Scootruk is made by the Novo Engine Co., 702 Porter St., Lansing 5, Mich. It will haul concrete, sand, cement, mortar, and other types of building materials.

Steering is by means of a single tail wheel, which permits maneuverability in tight places; the unit is said to turn within its own length. Power is provided by a 6-hp air-cooled Novo engine. The transmission has four forward speeds and reverse. Total weight empty is 1,000 pounds.

The edge of the bucket is 34 inches high, allowing it to be loaded at most concrete mixers without a pit or special platform. Dumping is controlled from the driver's seat or from the side of the bucket.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 93.

## Salem Tool Names Dealers

Six new dealers have been appointed by The Salem Tool Co., Salem, Ohio, maker of augers, rods, drill heads, bits, tamping rods, and the McCarthy drilling machine, both horizontal and vertical types.

They are: West Virginia Supply & Equipment Co., Clarksburg, W. Va.; W. W. Williams Co., Columbus, Ohio; A. T. Green Machinery Co., Pittsburgh, Pa.; Rish Equipment Co., Roanoke, Va., and Charleston, W. Va.; Diamond Supply Co., Evansville, Ind.; and O. D. Lindstrom Equipment Co., Birmingham, Ala.

## Paving Crew Pours 3,200 Feet in a Run

(*Continued from preceding page*)

As an example of the close-knit integration of the parts of this job, each load of forms was dumped ahead by three men, one of whose duties consisted of hand-shoveling a fine grade under the form bases. They were busy with shovels while the truck was being loaded; pin pullers were busy at the other end the remainder of the time. The job was organized so tightly that in the middle of one hell-for-leather afternoon, when a little concrete-patching job was urgently needed, the superintendent and paving foreman did this work rather than disturb the smooth-working parts of this great, fast-rolling highway machine.

### Safety and Welfare

The welfare and safety provisions for the men who make up this machine were evident everywhere. Sanitary paper Vee Cups were placed beside ice-water barrels. Well defined right-of-way for loaded batch trucks could be noticed.

So far as employee welfare is concerned, the Griffith Co. is a well established sound contracting firm, and many of the men work on a permanent year-round basis because the company lands job after job. A negro workman, for example, dumping sand-asphalt cushion, was entirely conversant with the proportion of asphalt to sand and with all the intricate little ramifications of his particular activity. That awareness is something which comes from long training and hard work on the part of employer *and* employee.

### Personnel

Ramrodding this fast-moving spread was Superintendent S. F. Immel, working under Griffith Co.'s ace District Manager, Thomas Latham. Walt Cody was in charge of the batch-plant work, the operations of which are described in a companion article.

George T. McCoy is the State Highway Engineer of the California Division of Highways, with E. T. Scott, District Engineer, at Fresno, and W. E. Bertken in charge of field work as Resident Engineer.

## Shop Drill Presses

Drill presses to serve shop needs are made by the Canedy-Otto Mfg. Co., 84 Thomas St., Chicago Heights, Ill. They come in floor and bench models with either single or multiple-spindle styles.

Power is furnished by electric motors varying in size from ½ to 2 hp, depending upon the size of the press. It is transmitted from the motor to the spindles by a V-belt. Belt shifting is said to be simplified through the mounting of the motor and its assembly on the Canedy-Otto tilting motor bracket. This bracket tends to maintain an even belt tension at all times, it is stated.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 94.


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The unit illustrated is a converted Army truck with a Root-Kalamazoo snow plow and a hydraulic scraper mounted under the truck body. The manufacturer has been making field tests of the unit for snow removal and secondary-road maintenance.

## Snow-Plow-Scraper Is Given Field Tests

Believing that the most effective research work for the improvement of mechanical equipment is done in the field, rather than in the laboratory, the Root Spring Scraper Co., Kalamazoo, Mich., has recently completed a series of field tests. These tests were designed to gather data for the users of snow plows and for highway maintenance men. They were conducted by touring the snow states with a converted Army truck equipped with a Root-Kalamazoo snow plow and a hydraulic scraper mounted under the truck body.

According to the company, the tests demonstrated that necessary pressure is developed to hold and cut at the correct angle for hard snow and ice removal. The unit was designed primarily for secondary-road maintenance. But the company states that use by county highway departments has proved the Root scrapers also practical for winter work.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

## Wheeler Roller Dealers

More dealers for 3 to 4-ton variable-weight gasoline-driven Wheeler rollers have been appointed by Shaw Sales & Service Co., Los Angeles, as follows:

Frantz Tractor Co., New York City; Credle Equipment Co., Utica, N. Y.; Brock Tractor Co., Buffalo, N. Y.; Eastcoast Equipment Co., Garwood, N. J.; R. S. McCeney Co., Silver Springs, Md.; Frantz Equipment Co., Philadelphia, Pa.; Bemmis Equipment Corp., Richmond and Roanoke, Va.; Construction Equipment & Supply Co., Wheeling, W. Va.; National Equipment Co., Louisville, Ky.; Eddy & Co., Detroit and Lansing, Mich.; Cooke Tractor Co., St. Louis, Mo.; Funkhouser Machinery Co., Kansas City, Mo.; Cate Equipment Co., Salt Lake City, Utah; Southern Idaho Equipment Co., Idaho Falls, Idaho; Caird Engineering Works, Helena, Mont.; Bud Fisher Co., Albuquerque, N. Mex.; W. P. Powell Machinery Co., Phoenix, Ariz.; Buran Equipment Co., Oakland, Calif.; Moore Equipment Co., Stockton, Calif.; Fresno Equipment Co., Fresno, Calif.; Clyde Equipment Co., Portland, Oreg.; A. H. Cox Co., Seattle, Wash.

Shaw Wheeler roller dealers in Canada are: René Talbot, Ltd., Quebec, Quebec; Mussens Canada Limited, Montreal, Quebec; Mumford Medland, Ltd., Winnipeg, Manitoba; Truck & Tractor Equipment Co., Toronto, Ontario; Western Tractor & Equipment Co., Regina, Saskatchewan; and Costello Equipment Co., Ltd., Calgary, Alberta.

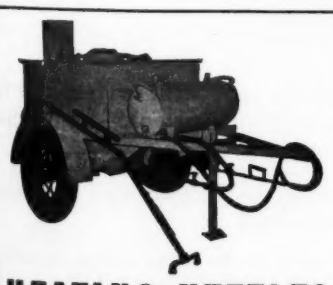
## Low-Bed Trailer Line

Low-bed trailers in 10 to 60-ton capacities are manufactured by The Winter-Weiss Co., 2201 Blake St., Denver 2, Colo. (Specialties also include truck bodies, dump bodies, sleeper cabs, transmissions, axles, power winches, etc.) Two-piece folding ramps are standard equipment for the low-bed machinery trailers. Single or tandem axles with 8 or 16 tires are optional.

Winter-Weiss low-bed machinery trailers are available in 10 to 60-ton capacities. A two-piece folding ramp is standard equipment.

The 20 to 25-ton Model STAS has a loading deck 8 feet wide, and 16 feet long, and tandem bogie-axle assemblies with eight 8.25 x 15 12-ply single tires. The Model WW-20 FTAS low-bed machinery trailer, also 20 to 25-ton, has eight 8.25 x 15 12-ply tandem rear tires and 10.00 x 20 12-ply dual fronts.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

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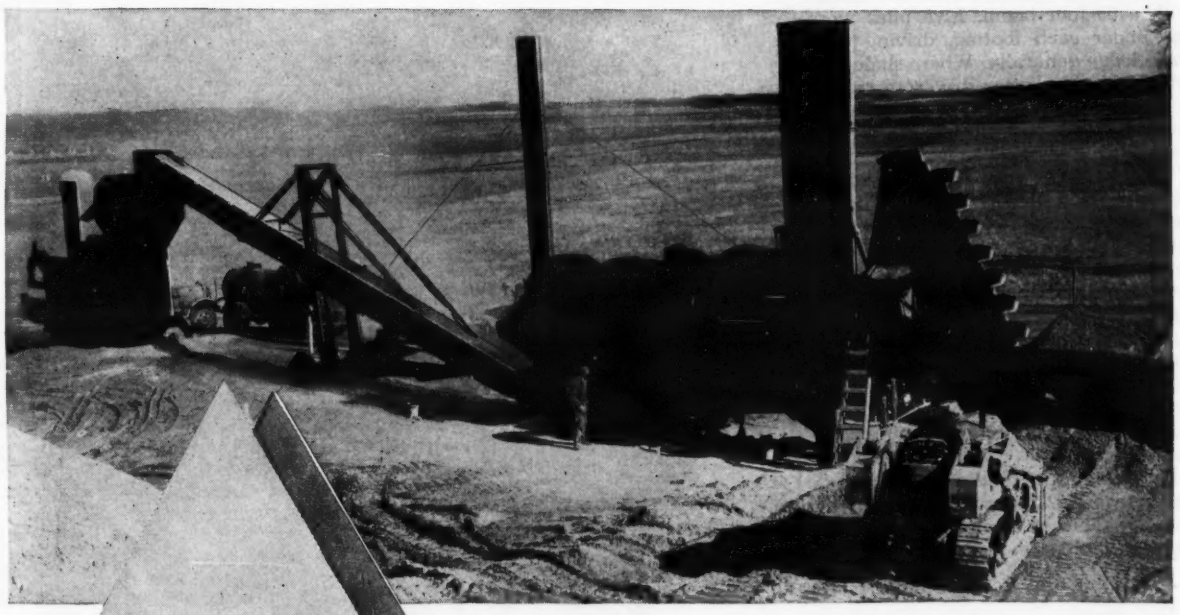

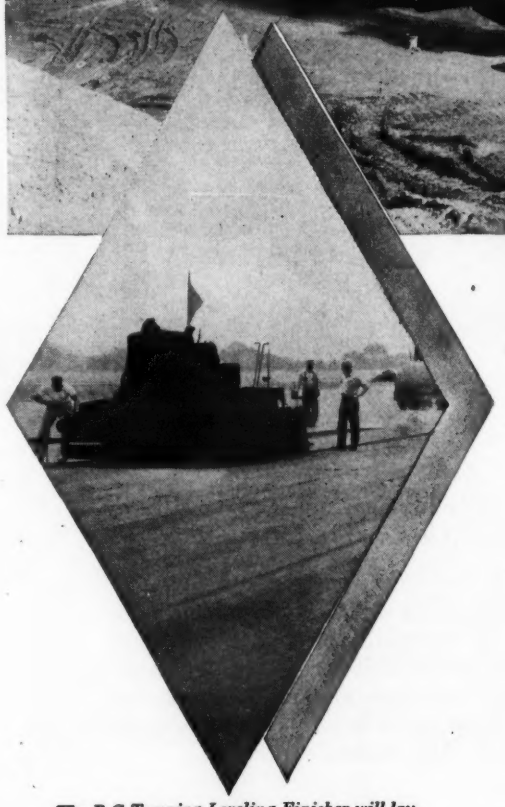

The B-G Tamping-Leveling Finisher will lay any mix, hot or cold. Places a continuous ridge-free surface with each succeeding strip firmly compacted against the previous one.

High-Capacity
"Intermediate" Mixing with Portability

Here's the B-G "Intermediate" Bituminous Mixing Plant that combines the convenience of true portability with the basic advantages of the B-G Bituminous Mixing System*. You can tow the units you need to the job, right to the spot that's most convenient and economical from the standpoint of aggregate source and need for finished mix.

In its accuracy the B-G "Intermediate" Plant bridges the gap between the B-G "High-type" and B-G Travel Plant. Capacity is from 80 to 120 tons per hour. It is used principally for single-aggregate mixes; however, an optional 2-compartment charging Bin, with B-G 2-gate Reciprocating Feeder, provides a method of feeding a fine and coarse aggregate where rigid aggregate gradation is not required. For details, write for literature, or see your B-G representative.

*THE B-G BITUMINOUS MIXING METHOD: Continuous flow, with measured volumetric aggregate content, metered bitumen supply, controlled temperature, and thorough twin-pugmill mixing —through flexible, coordinated portable units. Barber-Greene Company, Aurora, Illinois.

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Constant Flow Equipment

LOADERS PERMANENT CONVEYORS PORTABLE CONVEYORS COAL MACHINES BITUMINOUS PLANTS FINISHERS DITCHERS

# Railroad Overpass On By-Pass Highway

(*Continued from page 1*)

and concrete handrails accommodate pedestrians. Total width of the structure is 66 feet 2 inches, with sidewalks.

Principal bid items in the contract were 37,297 cubic yards of rolled-earth fill in the approaches, furnishing and placing 1,480,000 pounds of structural steel, and placing 2,100 cubic yards of reinforced air-entrained concrete. All work in connection with the overpass was handled by F. M. Reeves' equipment, with the exception of the earth approach embankments. They were erected under subcontract by Dean Word of New Braunfels, Texas.

### Footings on H-Beams

The slender 27-inch square reinforced-concrete columns were designed with heavy concrete pads, resting on five 10 x 10-inch steel H-beams 26 feet long. These bearing-pad locations were opened up by a Koehring truck crane with a 1½-cubic-yard clamshell bucket. Earth was mucked out to the grade line for concrete.

The steel piles were driven by a No. 1 Vulcan pile hammer, powered by a 40-hp upright boiler. Hanging leads were used on a Koehring Model 605 crane, with a 65-foot boom. Five piles were put under each footing, driving to a shale ledge generally. Where shale was found, the piles were driven to refusal and burned off square. They were put down to full penetration where the shale ledge was not in evidence.

The H-beams were capped by welding steel plates on each pile top. Footing pours were formed with 1-inch shiplap lumber with 2 x 6-inch studs on 15-inch centers. Pours were made direct from four Rex and Jaeger truck-mixers, hauling 2-cubic-yard batches from the near-by batching plant. The 1¼-inch dowel steel for each column left protruding from the footing was carefully cleaned after each pour, so a good bond would be insured when the columns were built.

Progress on the footings amounted to an average of 25 piles per 8-hour shift, and 30 cubic yards of concrete per pouring hour.

### Column and Beam Concrete

The slender columns and beams which support the structural girders and the floor slabs were all formed in a job carpenter yard. Fir plywood was used for the form lining. Forms for the columns were all completely built on the ground, and a network of steel reinforcing was installed. The complete column form, ready for pouring, was then picked up and set in place by the Koehring crane.

The forms were tied with adjustable square steel braces, set about every 16 inches along the form, and held securely by sliding steel pins.

Flexible elephant-trunk tremies were used with hoppers to place the concrete in the column pours. The mixed concrete was transferred to a 1-yard bucket and hoisted by the Koehring crane. A Master vibrator was used to consolidate the mass. The beams with their footings were also separated in the center to carry out the expansion-joint scheme; in fact, the new overpass is really two bridges set side by side and an inch apart.

Column forms were stripped four days after the pour had been made. They were then dressed immediately with Carborundum stone by an expert ornamental-concrete finisher who has been with the Reeves firm for many years.

According to Superintendent W. L. Craven and General Foreman C. C. Tedford, the use of Darex air-entraining agent in the mix made the concrete much more workable than it might otherwise have been, particularly in the column and beam pours where dimensions were small and the reinforcing steel heavy.

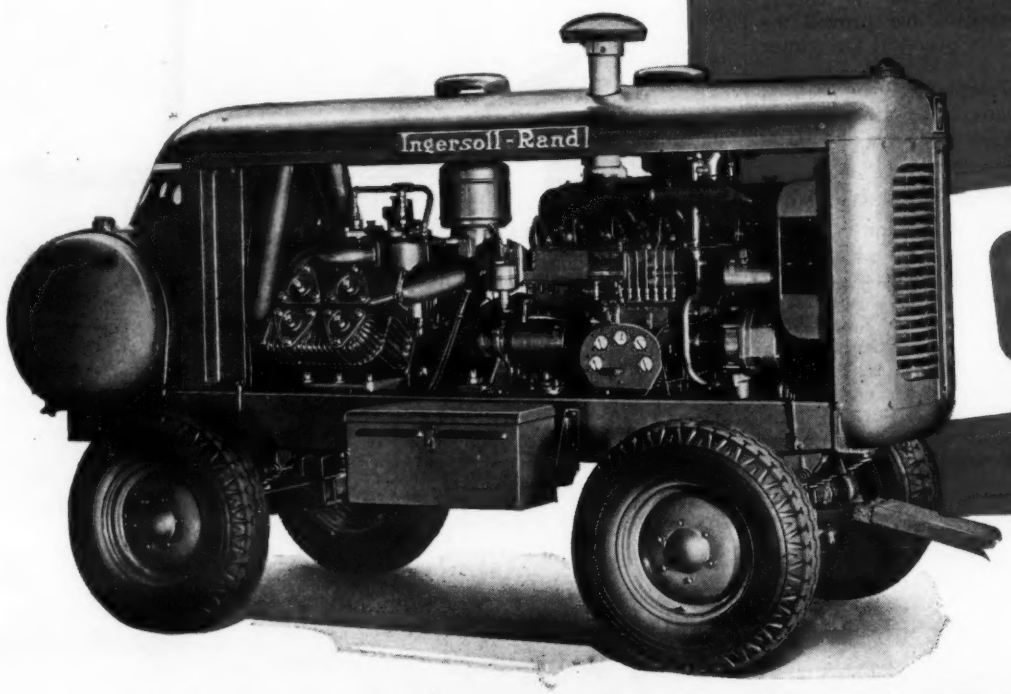
*C. & E. M. Photos*

**The Koehring crane in the background (above) places steel for the Austin, Texas, overpass. The prompt delivery of structural steel made this job perhaps the oddest of the 1946-47 construction season. At right, a laborer uses a wire brush to clean a molded curb form for the four-lane 801-foot-long overpass.**

"We used 4 ounces to the cubic yard," said Craven, "and were able to cut out

(*Continued on next page, Col. 4*)


KEEP




GET

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Effective lubrication—*Texaco Alcaid, Algol* or *Ursa Oil.*

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Because *Texaco Alcaid, Algol* and *Ursa Oils* are especially refined to free them of impurities that form hard carbon deposits. Any slight amount of carbon that may form in use is soft and fluffy—won't impede valve action.

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No. These oils keep rings free, too—and ports and air lines clear. Your compressors run more efficiently, give full air pressure at your drills. Thus you have less maintenance expense—fewer repairs and overhauls.

*All right, which of the three do I use—Alcaid, Algol or Ursa Oil?*

They're all in the same series, developed for effective compressor lubrication. Use the one recommended by Texaco Lubrication Engineering Service for your particular operating conditions.

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TONY MARTIN SHOW
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## Wagon for Hauling Gravel

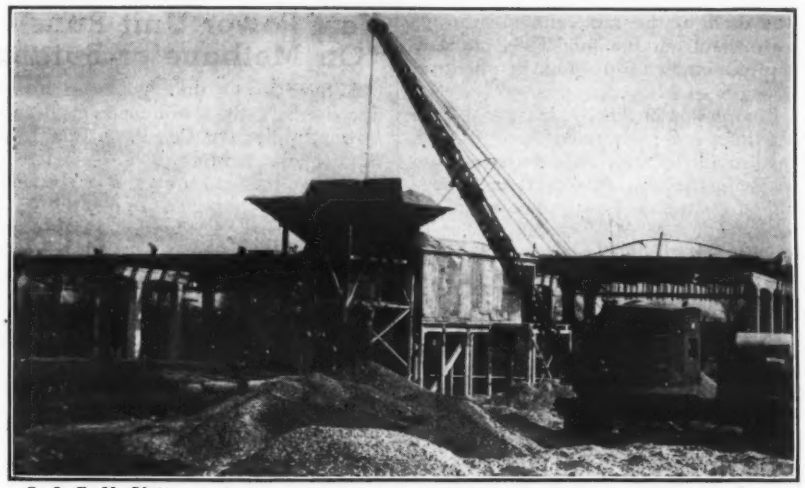
The use of its Mississippi wagons for hauling gravel is described in a bulletin distributed by the M-R-S Mfg. Co., Flora, Miss. The manufacturer recommends them for use by state and county road departments, and states that they can bring about substantial reductions in the cost of hauling gravel.

Contained in Form No. 108 is a reprint of a letter from a county highway official; in it he lists the comparative costs for his county of hauling gravel by truck and by the Mississippi wagons.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 72.

## Beckwith to Handle Marlow

The Beckwith Machinery Co., Pittsburgh, has been appointed by Marlow Pumps of Ridgewood, N. J., to handle its pumps in the Pittsburgh, Harrisburg, Bradford, and Wilkes-Barre territory. Beckwith will distribute Marlow self-priming centrifugal pumps, diaphragm pumps, and Walking Beam plunger pumps. These units have many applications in the construction industry for unwatering ditches, foundations, excavations, bridge piers, etc.



*C. & E. M. Photo*

**A Quick-Way truck crane with a ½-cubic-yard clamshell feeds sand and aggregate to the Johnson batch plant which Reeves & Sons erected 500 feet from the overpass.**

# Railroad Overpass On By-Pass Highway

*(Continued from preceding page)*

100 pounds of the harsh Colorado River sand and 4 gallons of water, still keeping our concrete yield the same. That's what you call a good return on a small investment!"

### Structural Steel

Before the deck could be poured, the structural girders from beam to beam had to be erected. One of the unusual features of the new overpass is the use of welding instead of rivets or bolts in the field. Special ball-joint bearing plates had been poured in place at the top of the concrete beams. A fitted shoe was welded to the bottom of the 3.24-ton I-beam girders, and they were set in place by the Koehring crane.

The 65-foot boom on the Koehring crane was extended by installing an 18-foot jib, which permitted the load line to reach any part of the overpass from either side.

The job might be called the oddest of the 1946-47 construction season, because structural steel was delivered on time and was not nearly the cause of delay it has been on some jobs. A rainy, wet winter at Austin caused more delay than any other condition, by making haul roads boggy.

The structural members were field-joined by welders using Lincoln arc machines and P&H steel welding rod. Small-diameter rod 5/32 inch in size was used, and each foot of weld was thoroughly peened.

### Concrete Deck Slab

The steel I-beam webs on the girders were used as a support for the reinforced-concrete deck slab. Deck forms were built in the carpenter yard at the job; 1-inch shiplap lumber was used for the form face, with 2 x 6-inch studs on 16-inch centers. The lumber was ripped to size on a saw table by a Le Roi-engine-driven Superior rip saw, and a Syracuse electric hand saw was used for small work.

The form panels were set on 4 x 4-inch stringers, supported every 4 feet by 4 x 4-inch timber jacks. The form panels were set true to grade by driving wooden wedges between the stringer and the form studding.

By prefabricating the deck-form panels, and cutting the 4 x 4-inch timber to dimension on the ground, three carpenters and four laborers were able to set up the forms for one of the deck halves in an 8-hour day. A safety scaffold with guard-rail supports was slung below the pour for the men to work on.

Deck pours were made by the Koehring crane and a 1-yard concrete bucket, transferring mixed concrete from the truck-mixers. The curbing was formed with a special wood molding on a form, and all such forms were wire-brushed and re-used after each pour. The drain scuppers were formed with 1-inch lumber, and stripped with a wrecking bar.

On one such pour about the time the job was visited for CONTRACTORS AND ENGINEERS MONTHLY, 40 cubic yards was placed in 2 hours and 20 minutes.

The concrete deck surface was given a modified belt finish, leaving the riding surface with plenty of traction for the vehicles that will be using it.

All concrete, including footings, columns, beams, and the deck surface, was cured for 7 days by spreading cotton mats and keeping them continuously wet.

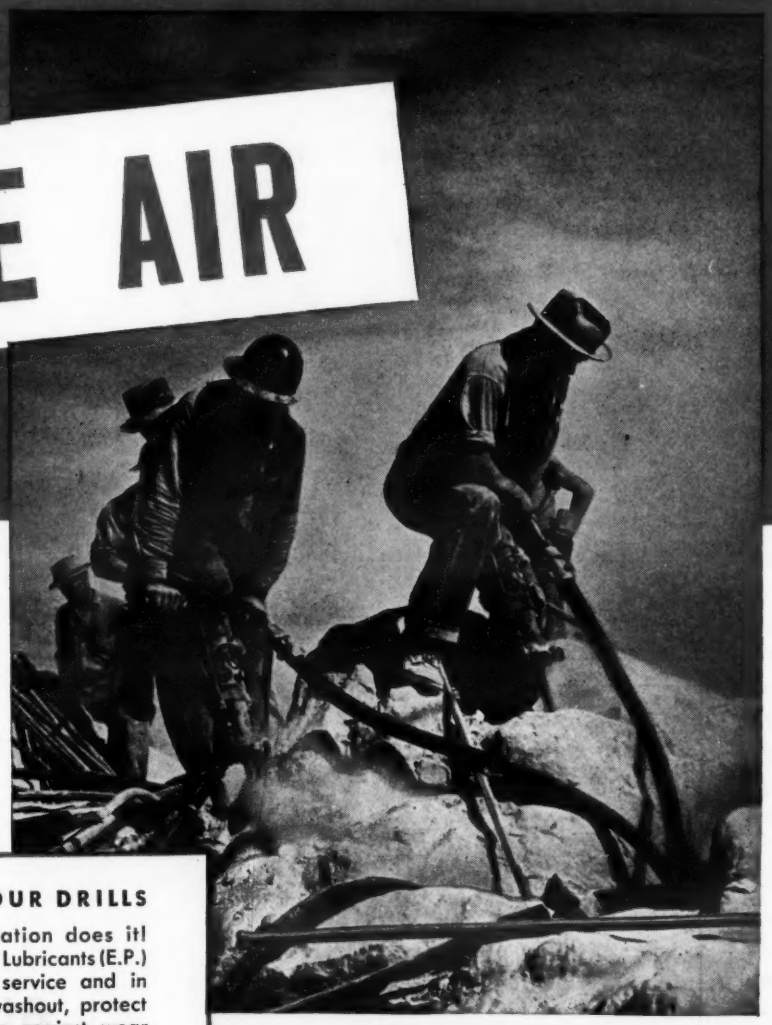
### Concrete Batch Plant

A small Johnson batch plant was erected about 500 feet from the overpass for the weighing and proportioning of sand and aggregates. Mixing water was

*(Concluded on next page)*

P VALVES CLEAN...

ET MORE AIR



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Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

## Railroad Overpass On By-Pass Highway

(*Continued from preceding page*)

brought in from a fire hydrant on the Austin city water system. It was metered by the plant operator and put in the truck-mixers.

Sand and aggregate were produced commercially from a natural deposit on the Colorado River near Austin, and hauled out to the batch plant. As the trucks dumped it in stockpiles, a Quick-Way truck crane with a ½-cubic-yard clamshell fed the two 20-cubic-yard batching bins on the plant. The mix was proportioned on the basis of a 1-yard batch, and two such batches were dumped into every truck-mixer load. Weighing, on a Fairbanks beam scale, was aimed at this formula:

| | | |
|---|---|---|
| Aggregate | 2,192 | lbs. |
| Sand | 1,105 | lbs. |
| Cement | 470 | lbs. |
| Water | 24.5 | gals. |
| Darex | 4 | ounces |

Longhorn standard portland cement was used in the mix, and test beams were made on the job. They checked approximately 670 pounds flexural strength each.

Completion of this overpass in a little less than one year from June 1, 1946, has provided a wide, safe route for auto traffic by-passing Austin. It is impossible to estimate how many lives the bridge will save, of course, but it is safe to say that it will carry its traffic load quite adequately for many years.

### Personnel

The job was designed and administered under the general supervision of State Highway Engineer D. C. Greer, with Jed Robinson as Construction Engineer. W. D. Dockery was District Engineer. William K. Schultz was the Project Engineer, with R. H. Fincher as Resident Engineer.

In addition to W. L. Craven and C. C. Tedford, who are Superintendent and General Foreman, respectively, the contractor was represented on the job by Office Manager E. L. Strickel.

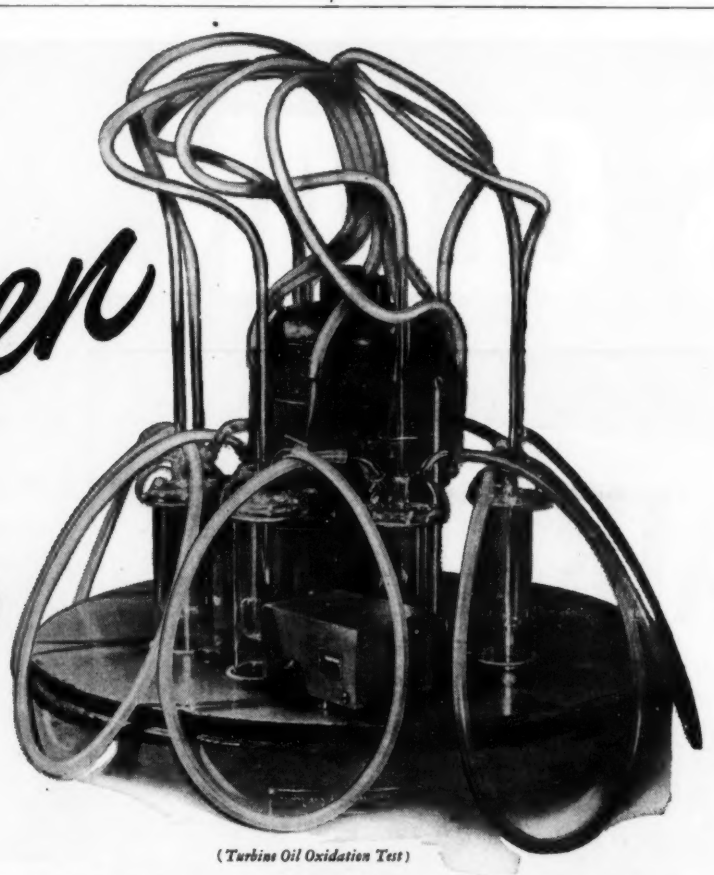
## New Power Unit Runs On Methane or Butane

A new power unit has been introduced by the Minneapolis-Moline Power Implement Co., P. O. Box 1050, Minneapolis 1, Minn. It is designed to run on either natural gas or butane. Models using gasoline or distillate are due for early production. Maximum corrected horsepower at 1,300 rpm is 200 for natural gas, and 215 for butane.

It is a 12-cylinder valve-in-head engine. Bore is 4⅝ inches, stroke is 6 inches, and piston displacement is 1,210 cubic inches. The MM 1210-12A dual unit is geared to a single power shaft. A front power take-off permits direct drive for tandem operation with another engine when added power is required. Or where opposite rotation is desired, the front power take-off may also be used. Instruments for both units are mounted on a single panel.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 14.


Oxygen ...FRIEND OR FOE?



(*Turbine Oil Oxidation Test*)

Without oxygen, man cannot live. Yet, reaction to oxygen may shorten the service life and destroy the value of a lubricant!

Sinclair is ever alert to the importance of knowing exactly how oils will resist oxidation which can form gums and sludge detrimental to equipment performance.

No satisfactory, quick, short time oxidation test methods have yet been developed. Sinclair Research does not compromise. Some studies require continuous tests of 1000 hours. Others, performed with the apparatus above, are run for 100 hours or more.

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BUY BONDS
BACK THEM

MARK well this button. It is worn by the men and women honorably discharged from the armed services. Though they are now in civilian clothes, let's not forget their service to our country and to us. They still rate our every consideration.

Posts 2 feet short of the contractor's design were used in this form for a rigid-frame reinforced-concrete bridge. The pony sets on top of the main posts were not carefully spliced and braced. As a result, the entire form collapsed during the pour. Worker injury cost $850. But the total cost of getting ready to pour again was $17,000.

# Job-Accident Costs Will Be $630,000,000

(*Continued from page* 1)

### Insurance Charges

Construction workers are protected against injuries on the job by workmen's compensation or employers' liability insurance. The cost of this protection is paid for by the contractor and must be figured in every job estimate. Now insurance rates are, with few exceptions, regulated by state laws. They are expressed as a per cent of job payroll. And they are developed from records of past accident compensation and medical payments in the several types of operations in the construction industry. Each operation, such as iron or steel erection, rock excavation, masonry, concrete construction or painting, has its own average or manual rate on a per-cent-of-payroll basis ranging to over $26 per $100 payroll.

### Good Record—Reduced Rates

However, average rates of all but the smallest construction firms are subject to an experience or merit revision. This takes into account the past accident record of the individual contractor. Thus his insurance charges are adjusted either up or down in line with past losses over a given period (three years in most states). Experience rating reflects the ability of construction management to operate safely. It gives an advantage to those who do operate safely by reducing manual rates, and a disadvantage to those who don't by increasing manual rates.

Here is an example: in making up a bid for a $1,000,000 project, a contractor with a poor accident record may be required to include an insurance item $20,000 higher than another firm with a good accident record.

### Direct Job Costs

An accident can be properly defined as an interruption in an orderly operation. Job accidents not only cause injury to workmen but interfere with operations. Further, they oftentimes result in damage to materials and equipment and in spoiled work. Studies have been made of construction accidents and their effect on job progress and efficiency. They have proved that losses averaging at least twice compensation and medical payments are incurred because of delays, material and equipment damage, and spoiled work.

### Actual Case Histories

These "direct" accident costs are illustrated by the following actual case histories of construction-job accidents.

*Case No. 1:* Monolithic concreting operations were under way on the arch of a rigid-frame reinforced bridge. The contractor's design of forms called for 8 x 8-inch posts 16 to 20 feet in height. But 14 to 18-foot lengths were used, with short posts on top to reach the required elevation. The column splice consisted of only one scab with no diagonal bracing to connect the main posts with the pony sets. As concreting progressed, the lateral thrust built up by the freshly poured concrete in the arches caused the column joints to topple, and the entire form collapsed. Ten minor injuries totaling $100 and one fractured pelvis costing $750 represented the insurance cost. Moreover, the rigid-frame arch had a span of 75 feet and was heavily built up with reinforcing steel. Before the contractor could get at the wreckage the concrete had an initial set, and it cost $17,000 to get the arch ready to pour again.

*Case No. 2:* A dockbuilder fell 18 feet from a stringer to the ground. In the belief that the injury was serious, an ambulance was called and the worker given first aid. Sixty men crowded around for three-quarters of an hour until the ambulance arrived, while four cranes stood idle. Diagnosis showed the injured worker suffered a bruised back, and he returned to work in four days. Hospital and medical bills totaled $35. Loss to the contractor in job delays, worker and equipment idleness,

(*Concluded on next page*)


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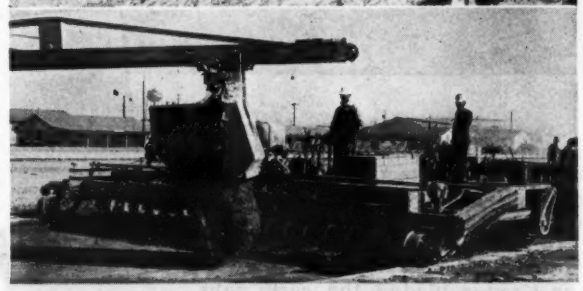
**for modern paving work**

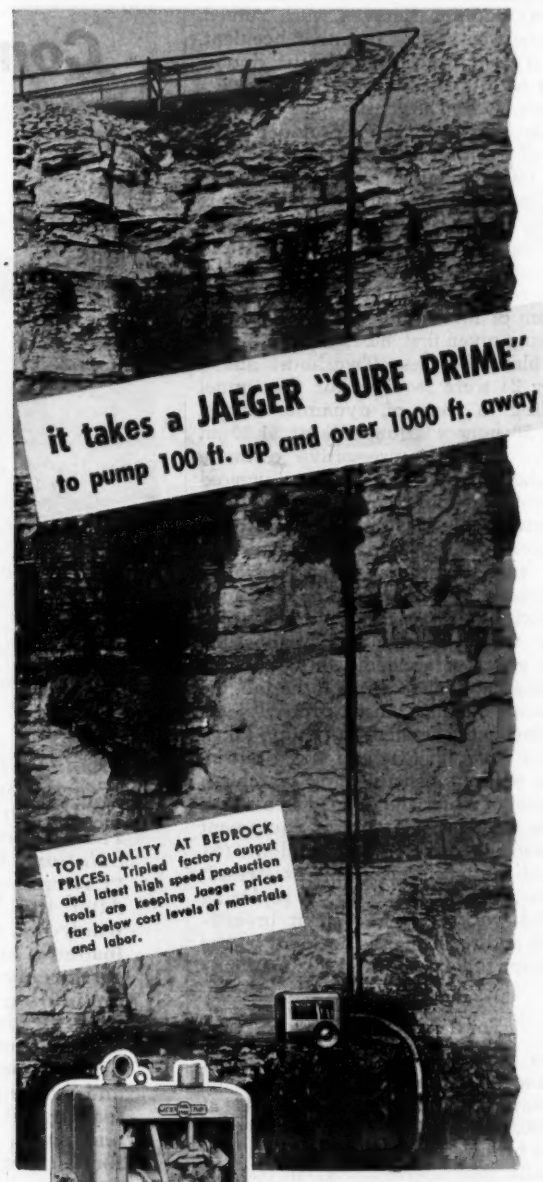
*Julius Porath & Sons Co., Detroit, laying super-elevated curve of 35° maximum slope with ingenious strike-off mounted on Jaeger Finisher.*



Jaeger Screw Spreader remixing as it places stiff material.

Jaeger High Speed Finisher sets fast pace for two big pavers.

When you buy paving equipment today, make sure it will equip you to meet the problems that are coming — entirely different specifications, new designs of pavements and paving materials presenting problems of remixing, of internal deep vibration, of laying new contours, of finishing new types of concrete — and always the problem of keeping your job costs below your estimates. Your Jaeger distributor knows the most modern paving machinery and its possibilities. Talk it over with him. You'll be ahead.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After 2 other well-known pumps tried it and failed, a standard Jaeger 4" Pump successfully handled this tough pumping job at Westlake Quarry, St. Louis, Mo. Remember this when you buy pumps: *Jaeger "Sure Primes" are built and powered far beyond ordinary standards and kept efficient by weather-proof enclosures which no other pumps provide.* Sizes 1½" to 10".

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# Job-Accident Costs Will Be $630,000,000

(*Continued from preceding page*)

totaled $150.

*Case No. 3:* In wheeling a load of face brick over an inclined single-plank runway roughly thrown together, a worker lost control of the wheelbarrow and fell. He was not injured. But the damaged brick cost the contractor $35.

*Case No. 4:* For a timber tank, 4 x 12-inch redwood staves were hoisted by a rope sling with a timber hitch 6 feet from the lower end, and the line was continued to a half-hitch 5 feet from the top and thence into the fall line of a crane. While three staves were being hoisted, the center one slipped out; all three fell and were splintered. Tank erection could not then be completed and temporary lashing was provided while additional material was shipped from the west coast. A wind storm collapsed the temporarily lashed tank and twenty additional staves were ruined. No one was injured in either accident, but it cost the contractor just double what he estimated to build the tank.

*Case No. 5:* The ventilation system on a mile-long rock tunnel provided 5,000 cfm of fresh air at the tunnel heading. But this amount in a 750-square-foot section was inadequate from the start of the job. Gasoline and diesel-powered equipment was in constant use in the tunnel and 1,000 pounds of explosives were used per day. A steady stream of tunnel miners was constantly being given first aid from equipment and blasting fumes. Two hours out of every 24 were required for the tunnel heading to clear of dynamite fumes, with 50 miners sitting idle at $1.25 an hour. Even a conservative estimate of the production losses incurred amounted to many thousands of dollars.

Innumerable histories could be cited of accidents from material handling and material storage, uncontrolled movement of equipment, and failures of cofferdams, scaffolds, and forms. They would substantiate further the total effect of accidents on job costs. When an accident occurs on the job, the following costs must properly be charged to the accident: (1) time taken out for first aid; (2) time taken out by other workers assisting and watching; (3) cost of material damaged as a result of the accident; (4) cost of equipment damaged as a result of the accident; (5) cost of equipment made idle as a result of the accident; (6) cost of replacing spoiled work; (7) time spent investigating and reporting the accident by the foreman, timekeeper, and superintendent.

### Total Accident Costs

The Associated General Contractors of America estimate the dollar volume of construction for the year 1947 at $20,000,000,000. Applying a 35 per cent factor for direct labor costs, the 1947 job payrolls will aggregate $7,000,000,000. On the basis of a national average compensation-insurance rate of $3 per $100 of payroll, the nationwide compensation-insurance costs will total $210,000,000. With the conservative addition of direct-job costs of $420,000,000, it is clear that construction accidents will cost $630,000,000 in 1947.

### Who Pays?

Many will share in the loss of $630,000,000 that will be literally thrown away in 1947 as a result of construction accidents. The injured worker pays because he suffers financially as well as physically. Compensation provides payment of only a percentage of average weekly earnings to an injured worker. He loses the difference between his regular wages and the sum paid to him under compensation.

The job superintendent and foreman pay because the output of their crews is thrown out of gear every time an accident occurs; this results in lowered performance records and less accomplished per man-hour.

The contractor, and indirectly the investors, pay because of job delays, material and equipment damage, spoiled work, and the adverse effect of accidents on compensation-insurance rates and, finally, on increased overall cost of a delivered structure.

### Efficient and Safe Operation

Accidents are a continuing challenge to the construction industry. A study of thousands of such accidents clearly indicates that accident prevention and efficient operation are interrelated. How a contractor plans to perform an operation is the outstanding factor in determining what accidents, if any, are likely to occur. A real effort to include accident prevention in job planning will do much towards reducing the expected construction-accident cost for 1947.

Everybody has commented on the really beautiful four color illustrations contained in the VICTOR Bulletin Form 20 . . . it covers fine welding and cutting equipment . . . it will be yours, free, for the asking. Write us today for your copy.
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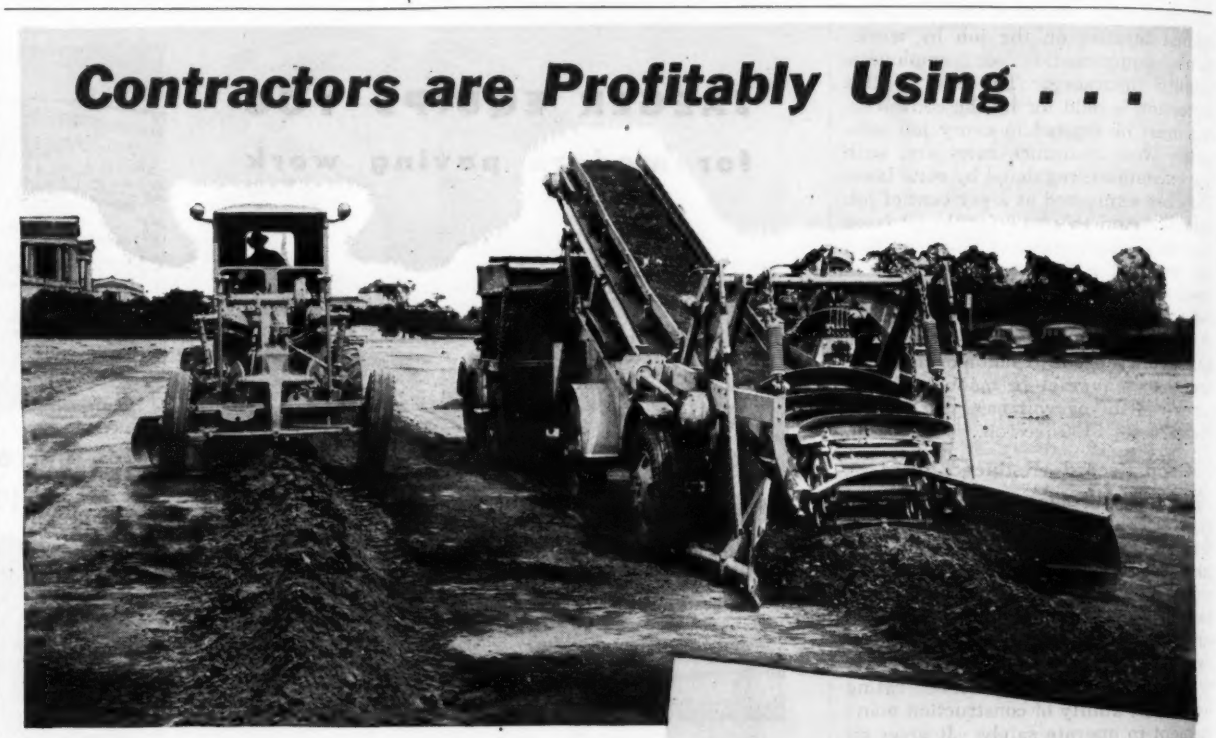

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# Varied-Type Rolling Required at Airport

## Concrete Runways Laid on Well Compacted Subgrade And Sub-Base; Fill Taken From Drainage Ditches

✦ THE new CAA Class 4 airport at Opelousas, La., is characterized by smooth concrete runways, taxiways, and apron. The vast amount of work that went into a proper foundation for that pavement is naturally not apparent now that construction is completed. Laying some 218,893 square yards of pavement presented no great problem, and was completed in May after three months of concreting. But readying the site for paving operations was no such routine story.

The entire area to be paved had to be elevated above the surrounding nearly flat topography, a feature of southern Louisiana. Fill material was not readily available and drainage was difficult. However, deep drainage ditches dug around the field solved those two problems: they carried away storm water and also served as borrow pits.

But there was still another problem. This fill material, put down in 6-inch layers for a subgrade, had to be compacted to a 90 per cent modified Proctor density. So did the 4-inch sub-base laid on top of that. The 8½ feet of rainfall that fell in the Opelousas area in 1946 complicated earth-work operations. Material had to be dried out by aeration. Then it had to be compacted by sheepsfoot, steel flat-wheel, and pneumatic-tire rollers, until the foundation was nearly as hard and smooth as the concrete that was then laid on top.

The Civil Aeronautics Administration awarded a $771,305 contract to T. L. James & Co., Inc., of Ruston, La., for constructing the new field known as the St. Landry Parish Airport. At the time of letting, one turf landing strip was the sole facility at the site, which is located about a mile northwest of Opelousas. The contract included grading, drainage, and paving.

Now the new field has three runways, 12,000 feet of taxiways, and a warming-up apron, all paved with concrete. All runways are 100 feet wide. The N-S runway is 4,550 feet long. It is crossed in the southern half by the NW-SE runway, also 4,550 feet long, and by the 4,050-foot NE-SW runway. The two intersecting runways form an X. The pavement is crowned at the center with a 0.5 per cent slope for the first 25 feet, and a 1 per cent slope for the remaining 25 feet. The profiles of the N-S and NW-SE runways slope from a high point at the center down 0.2 per cent grades to either end. The NE-SW runway drains to the southwest on 0.1 and 0.05 per cent grades.

Although no shoulders have been built bordering the runways, the ground has been graded for a 250-foot strip on each side. About 350 feet to one side of the runways are 50-foot taxiways which are flanked by 100-foot graded strips. A 100 x 300-foot apron is located near the intersection of the three runways. The apron, taxiways, and the final 500 feet at the ends of the runways are paved with 7-inch concrete slabs, while the remainder of the runway pavement is 6 inches thick. No mesh

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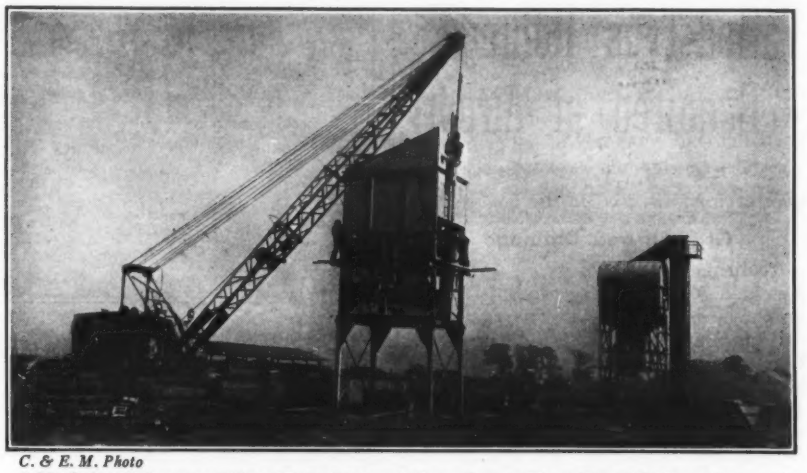

*C. & E. M. Photo*

**A Koehring 604 crane with a 55-foot boom helps set up a Blaw-Knox 300-barrel cement bin for Contractor T. L. James's batch plant. Behind it is a Johnson 375-barrel cement bin. Farther back are sand and gravel stock piles around the aggregate bin.**


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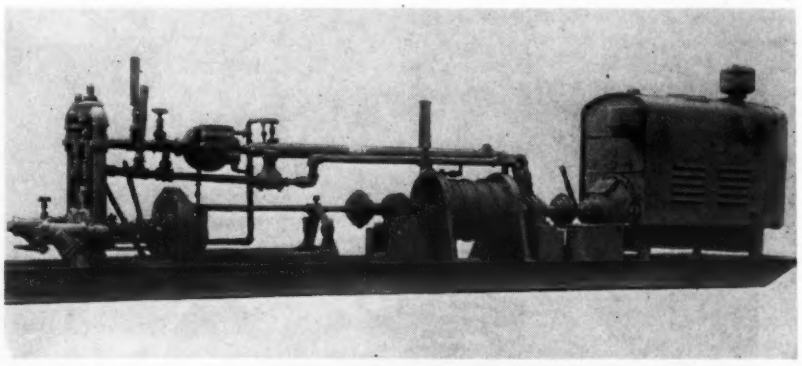

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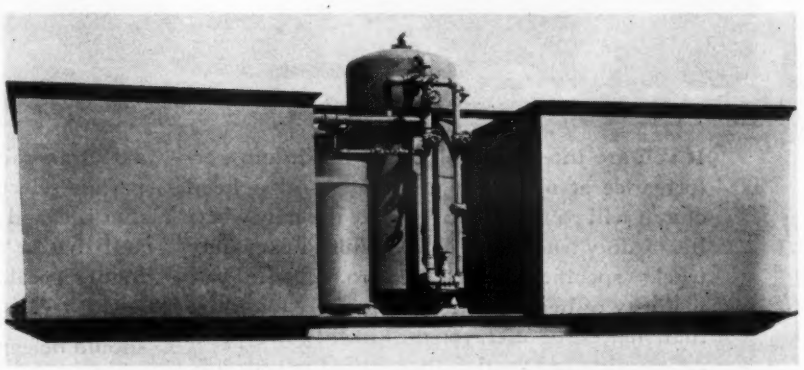

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# Varied-Type Rolling Required at Airport

(*Continued from preceding page*)

reinforcing was used in the concrete.

### Grading and Drainage

To bring the airport grade up to the specified 70 elevation, a total of 320,000 cubic yards of material was required. Of this amount 140,000 yards was obtained by grading the field, taking off some rolling high spots and filling in adjoining hollows. Three borrow pits rimming the site yielded 20,000 yards. But most of the yardage was taken from drainage ditches encircling the field beyond the taxiways. This source of material furnished the remaining 160,000 yards required, or half the total excavation. Thus all the earth grading operations took place at the site itself.

Work got under way on December 18, 1945. The contractor started by digging the 20,400 linear feet of open ditches for the dual purpose of draining the field and supplying material for the fills. The ditches are from 4 to 15 feet wide at the bottom and are from 6 to 12 feet deep. Their outlet is at the western end of the airport where a 3,200-foot ditch carries the water off to a bayou.

Draglines handled the excavation. A Koehring 604 dragline with a 55-foot boom and a Page 2-yard bucket did most of it, loading to a fleet of rubber-tired earth-movers. These included two Hug 8-yard semi-trailer wagons, three Mississippi 9-yard wagons, four 12-yard and six 9-yard bottom-dump Euclids. Of these units an average of only six was used at a time on hauls which ranged up to 1½ miles but averaged about 2,000 feet. The same excavating and hauling equipment was used at the borrow pits.

Tractors and scrapers graded the gently rolling site where the hauls averaged 600 feet. These units included four LeTourneau scrapers — two 12-yard models pulled by Caterpillar D8's and two 9-yard units with D7 tractors. In addition to the normal cut and fill grading, about 15,000 yards of field excavation was undercut to remove material unsuitable because of its wetness. This was replaced with dry earth from the borrow sources. Scattered about the airport are 19 catch basins into which pipe drains empty, and from which storm sewers conduct the water to the open ditches.

*C. & E. M. Photos*

**Subgrade at the new CAA airport at Opelousas, La., was compacted by sheepsfoot rollers. One of the units—a LaPlant-Choate 3-drum sheepsfoot roller pulled by a Caterpillar D7—is shown at the left. The 4-inch sub-base was compacted to the same density as the subgrade, but in this case a Bros Wobble Wheel rubber-tire roller (at right) was used. It was weighted down with sand and pulled by a Minneapolis-Moline MM6 rubber-tired tractor.**

### Pulverizing and Aerating

The subgrade was built up in 6-inch layers of gray silty clay. Where the tractor and scraper units handled this material it was well pulverized during the placing. But when excavated by the dragline and dumped by the wagons, the A6 clay had to be broken up into smaller pieces and pulverized before being rolled. This was done with assorted plows and harrows pulled by D4, D6, and D7 tractors. These included a Killefer disk harrow, McCormick-Deering and Oliver disk harrows, a Minneapolis-Moline tooth harrow, a John Deere gang plow, and a Seaman Pulvi-Mixer.

Rain harried the contractor considerably in 1946. During January of that year not a yard of dirt was moved because of the wet weather. During June and July all grading was suspended

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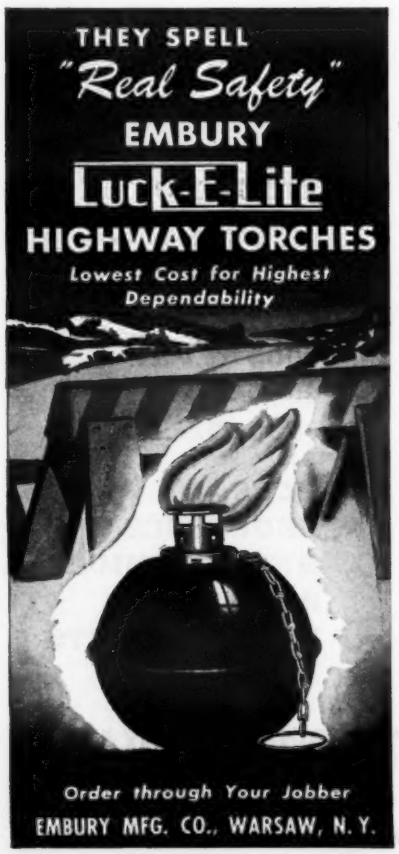

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# Varied-Type Rolling Required at Airport

(*Continued from preceding page*)

over a 42-day stretch on account of rain. The same equipment used in pulverizing was put to work aerating the soil to dry it enough so that the 90 per cent modified Proctor density might be obtained.

The subgrade was compacted by sheepsfoot rollers; there were about 10 drums on the job. A typical hook-up observed was a LaPlant-Choate 3-drum unit in parallel, the drums measuring 4 feet x 40 inches in diameter with 7-inch feet, and pulled by a D7 tractor. Three rollers were usually in action all the time. Seldom was it necessary to add water to get the proper compaction. But when it was required, it was pumped from the drainage ditches by a Jaeger 4-inch pump into a 1,000-gallon tank truck which sprayed it on the fill through a 10-foot bar at the rear.

After the subgrade material had been dumped by the wagons, spread in 6-inch layers by the tractor-dozers, and compacted by the sheepsfoot rollers, it was shaped to grade by some of the seven Caterpillar motor graders that formed part of the contractor's equipment. After this blading, a Huber 10-ton 3-wheel roller gave the subgrade a final rolling to attain the required density; it was attained more easily as the drainage of the field neared completion.

### Four-Inch Sub-Base

A 4-inch sub-base was then laid on the subgrade over the entire area to be paved. Material was obtained from a pit on a farm about 5 miles from the airport; it conformed to the following specifications for a Class II sub-base:

| | |
|---|---|
| Liquid limit | not greater than 35 |
| Plasticity Index | not greater than 8 |
| Maximum sieve size | 2-inch |
| Per cent passing No. 80 sieve | 5 to 65 |
| Per cent passing No. 200 sieve | 3 to 35 |

To obtain the sandy-type material, the contractor first used two tractor-scraper combinations to strip off about 14 feet of overburden. Then a Koehring 304 dragline, equipped with a 40-foot boom and a Hendrix 1-yard bucket, removed the material. Cutting 25 feet deep, it loaded the sandy loam into the three Mississippi 9-yard wagons and a fleet of fifteen Ford and Chevrolet 4-yard dump trucks hired by the yardage hauled. The material was stockpiled adjacent to the runways until the subgrade was completed. Then it was spread by the tractor-scraper units; or else it was loaded into the Euclids and Mississippi wagons by the crane fitted with a clamshell bucket, and dumped over the field.

As with the subgrade, the material was spread and shaped by the dozers and motor graders and compacted to the same density. In this case the density was obtained, however, by a Bros Wobble Wheel rubber-tire roller, with six wheels forward and seven rear. It was weighted down with sand and pulled by a Minneapolis-Moline MM6 rubber-tired tractor.

Compaction problems were not confined to the subgrade and sub-base alone. For example, the type of material available was not always suitable for backfilling around some of the drainage pipe. Pneumatic tampers driven by a couple of Le Roi portable 105-cfm compressors were used around the pipe to good advantage. In other cases the soil was too wet even for that. So it was removed, and a sand-cement grout was placed around the pipe to the top so as not to hold up the whole job. The backfilling was then completed in 6-inch lifts with tractor-scrapers. Compaction with the smooth-wheel roller followed.

### Batch Plant

A 4,000-foot spur track was constructed from the Southern Pacific railroad to the intersection of the three

(*Continued on next page*)


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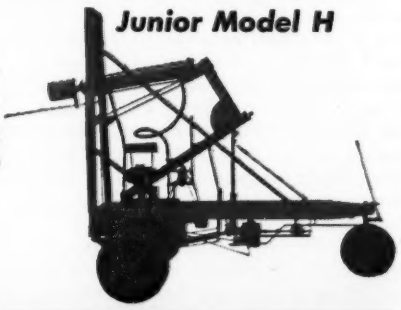

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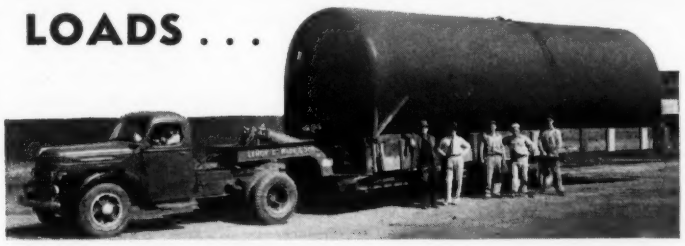

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# Varied-Type Rolling Required at Airport

(*Continued from preceding page*)

runways. And there the batch plant was set up. It consisted of a Johnson 110-ton 2-compartment aggregate bin, on either side of which was stockpiled sand and gravel; and about 700 feet further on were two cement-storage bins, a Blaw-Knox 300-barrel and a Johnson 375-barrel, located 100 feet apart. Because it was hard to obtain cement, the contractor decided to set up two storage bins to avoid stoppages from lack of material.

Bulk cement was purchased from both the Lone Star Cement Corp. at New Orleans, La., and from the Arkansas Portland Cement Co. at Okay Junction, Ark. Unloading was done by a worm gear under the track; it carried the cement to an enclosed elevator which raised it to the bin. The bins were placed so that the batch trucks could run under them when loading.

Sand and gravel were obtained from the Gifford-Hill Co. at Turkey Creek, La., about 50 miles northwest of Opelousas, and shipped in gondola cars to the plant. There the material was unloaded by the Koehring 604 crane with the 55-foot boom and a Blaw-Knox 1¾-yard clamshell bucket. This crane also kept the bins charged during the paving operations. The dry weights of a typical batch to which 38 gallons of water was added were as follows:

| | |
|---|---|
| Cement | 532 lbs. |
| Sand | 1,504 lbs. |
| Gravel | 2,720 lbs. |

The gradation limits of the sand and gravel used in the mix were:

| Sieve Size | Gravel | Sand |
|---|---|---|
| 2½-inch | 100 | .... |
| 2-inch | 80-100 | .... |
| 1-inch | 50-90 | .... |
| ½-inch | 15-40 | .... |
| No. 4 | 0-5 | 95-100 |
| No. 16 | ..... | 45-80 |
| No. 30 | ..... | 25-55 |
| No. 50 | ..... | 10-30 |
| No. 100 | ..... | 2-10 |

### Concrete Paving

Paving operations started in March when the 4-inch sand and part-clay sub-base was ready to receive the Blaw-Knox steel road forms. About 7,000 linear feet were available on the job. Nine-inch forms were used, as the pavement on both taxiways and runways is increased to that depth from a point 3 feet back from the edges. The forms were set by a crew of 10, then further secured in place by a Cleveland form tamper. Two rows, of course, were set for the first 25-foot lane. But as the paving progressed from one lane to the next, only one additional row had to be set each time.

A Ben Flynn self-propelled power subgrader then cut the fine grade to exact dimensions, casting the excess dirt off on both sides. Because of the compaction already obtained on the sub-base, no further rolling was necessary.

Wood keys were nailed to the forms on one side with roofing tacks on 2-foot centers to form a bond with the adjoining slab. This 1-inch-thick wood strip measured 1⅝ inches on the side projecting into the concrete, and 2⅝ inches on the side next to the form. The forms and strip were then given an oil coating. The key was fastened at half depth of the form.

Although no mesh reinforcing was put in the pavement, the expansion, contraction, and longitudinal joints are well doweled. Laclede Steel Co. of St. Louis, Mo., furnished the assemblies. In the expansion joints they consist of a ¾-inch strip of asphalt-impregnated felt through which run 1-inch round x 16-inch smooth dowels on 12-inch centers. Expansion joints are spaced at 120-foot intervals while the dummy-groove contraction joints are on 15-foot centers. Dowels for the latter are ¾-inch round x 16-inch and are on 18-inch centers. The groove in the surface is made with steel strips, ⅜ inch thick; it is 1½ inches deep x 12 feet 5 inches long. A similar dummy-groove contraction joint runs longitudinally down the center of each slab, dividing it into 12½-foot lanes. In this joint ⅝-inch round x 30-inch tie bars are set on 30-inch centers.

*C. & E. M. Photo*

**For equipment repairs and storage on the Opelousas, La., airport job, Contractor T. L. James set up a 110 x 40-foot Quonset hut. Workmen are assembling a planer in front of it to be used as a spare when concrete paving gets under way.**

The joints were set well ahead of the Koehring 34-E dual-drum paver which moved along outside the forms. Ten trucks, Fords and Chevrolets, holding two batches each made the 2,000-foot average haul from plant to paver with the cement, sand, and gravel. Water was added at the paver from three Ford trailer tank trucks of 1,700-gallon capacity. For water supply 12,000 feet of drainage ditch was dammed with an earth wall complete with spillway; this made a canal from which the water was pumped by a Novo 4-inch pump.

After the batches were mixed one minute they were dumped on the sub-base and spread by a Jaeger-Lakewood 2-screed finisher. At the front end was rigged a Jackson Monotube vibrator which vibrated the concrete as it was being spread between the forms. Behind the finishing machine came a Cleveland 15-foot 8-wheel bridge straddling the forms; from this the longitudinal joints were inserted into the concrete.

A similar type of bridge, but only half as long, came next and was used to set the transverse joints. This was followed by another large bridge from which the longitudinal finishing was done by two men with a bullfloat—a 10-foot steel angle iron with a plow

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# Varied-Type Rolling Required at Airport

(*Continued from preceding page*)

handle at each end. Working from the sides, two finishers checked surface smoothness with long-handled straightedges and then drew a 10-inch canvas belt over the wet concrete. Two other bridges, one short and one long, completed the parade; they were used for removing the transverse and longitudinal steel strips, respectively, from the mix which was now beginning to acquire its initial set.

The joints were then edged with a ¼-inch-radius tool. Membrane curing was effected with the Hunt Process. The forms were removed and moved ahead after 24 hours had elapsed. Two days later the joints were poured with Tee Juana mineral-filled asphalt. The 50-gallon drums were heated until the material flowed readily when it was transferred to pouring cans. As a final step the concrete pavement was thoroughly cleaned by a Littleford power broom and blower.

### Contractor's Shop

For repairs and storage the contractor erected a 110 x 40-foot Quonset hut. This was equipped with a Brunner air compressor, a Lincoln 300-amp electric welder, a Quick-Charge battery charger, a press, and a Sioux ½-inch heavy-duty drill. Heavy lifting was done on an A-frame with a Yale & Towne 1½-ton hoist. Wood workbenches were located along the walls for handling small jobs. A wood-burning stove furnished heat. Shell gas and oil products were used by the contractor.

The airport is enclosed by woven-wire fence 4 feet 2 inches high, which is topped by two strands of barbed wire. Supporting the fence on 15-foot centers are 2½ to 5-inch-diameter wooden posts which have been placed in holes 2½ feet deep. Holes were excavated with a Winpower post-hole digger working off the power take-off on a Minneapolis-Moline MM6 tractor.

### Quantities and Personnel

The major items in the construction of the St. Landry Parish Airport at Opelousas, La., were:

| | |
|---|---|
| Excavation | 320,000 cu. yds. |
| Sub-base, 4-inch | 26,000 cu. yds. |
| Concrete pipe, 8 to 30-inch | 20,800 lin. ft. |
| Sodding | 15 acres |
| Concrete pavement, 7-inch | 110,093 sq. yds. |
| Concrete pavement, 6-inch | 108,800 sq. yds. |
| Woven-wire fence | 22,011 lin. ft. |

T. L. James & Co. employed an average force of 55 men on the construction of the airport under the direction of Robert Hill, Project Manager. For the Civil Aeronautics Administration, F. G. Tappan was Resident Engineer. The project was under the general supervision of the Regional Administrator with headquarters at Fort Worth, Texas.

## Ignition-Repair Kit

A new automotive ignition kit for repairs and replacements on standard 7-mm high-tension wiring is announced by Aircraft-Marine Products, Inc., 1819 No. 4th St., Harrisburg, Pa. The kit includes an AMP installation tool, a supply of the newly designed straight-on and right-angle spark-plug terminals, and distributor-cap terminals.

The use of these terminals is said to eliminate all preparation of the wire. The special AMP hand tool furnished with the kit makes the complete installation. It cuts the wire with a built-in wire cutter; it also installs the terminal with two operations of the specially designed crimping jaws for spark-plug terminals, and one operation for the distributor-cap terminal.

The terminals are constructed of heavy-gage materials. A snap-on dimple on the terminal barrel is designed to insure positive engagement and even pull-out. When the terminal snaps into proper position, it can be heard and felt.

Action of the AMP crimp forces the insulation-piercing contact point into the cable parallel to wire strands, with a positive wiping contact for maximum electrical conductivity without risk of shearing strands. AMP spark-plug terminals have two contact points because of extra vibration at spark plugs. Points penetrate the cable from opposite sides, crossing within the wire. The crimp is said to afford a strong insulation support.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 24.

## I-H Vice Presidents

Giles C. Hoyt and General Levin H. Campbell, Jr., have been elected Executive Vice Presidents of International Harvester Co. of Chicago, by its Board of Directors.

## Clay Products Described

A bulletin designed to aid builders, engineers, and public-works planners has been issued by The Robinson Clay Product Co., Second National Bank Bldg., Akron, Ohio. Free of charge, Bulletin No. R-846-11 carries dimensions and specifications of sizes and fittings for sewer and drain pipe and many other varieties of clay products.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 65.


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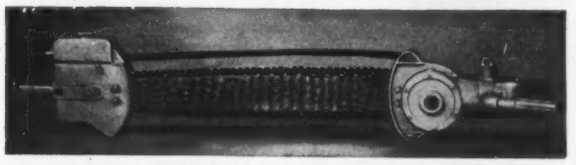


That's the experience of a prominent Chicago organization with the new Lombard air saw. Six average 14" diameter piles were cut in 7 seconds—normally would take two men with hand saw 1½ hours. Weighs only 46 pounds. Demonstrations available by local dealers in most states. Immediate delivery on air, gas and electric units.

**LOMBARD CHAIN SAWS**

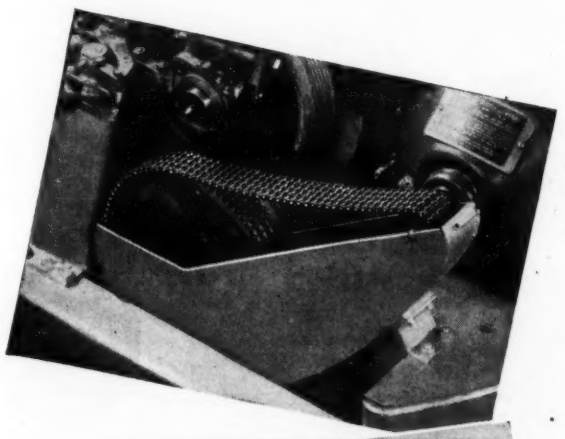
Lombard Governor Corporation — Ashland, Mass.

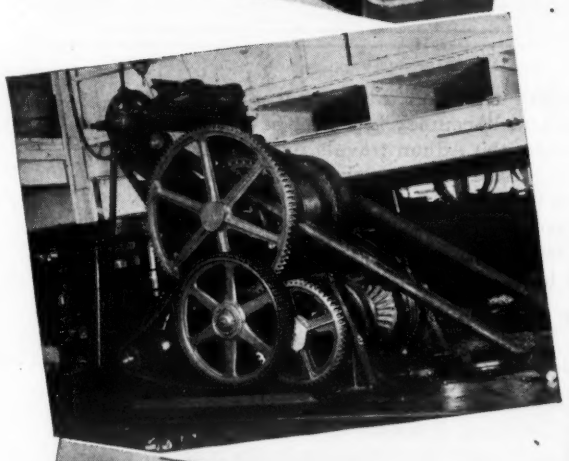
**To Eliminate Trouble and Noise**

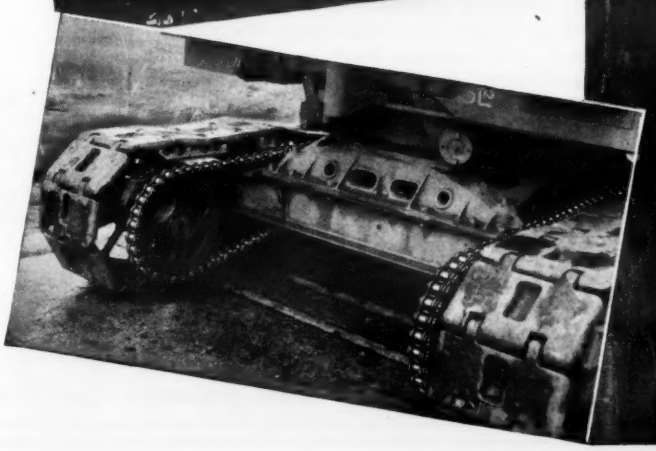
**Excerpt from letter from construction contractor:**

"We wish to change from a gear train drive to a chain drive on our..... Dragline to eliminate the trouble we are presently having. The gears are: one engine pinion, intermediate and driven gears.

"We have used your multiple strand chain drives on other makes of machines and like the performance and trouble-free operation, as well as the elimination of noise."







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Great Strength, Compact, Quiet, No Slip.
Found on the Leading Makes of
Construction Machinery and Equipment.

DIAMOND CHAIN COMPANY, Inc.
Dept. 487, 402 Kentucky Ave., Indianapolis 7, Ind.
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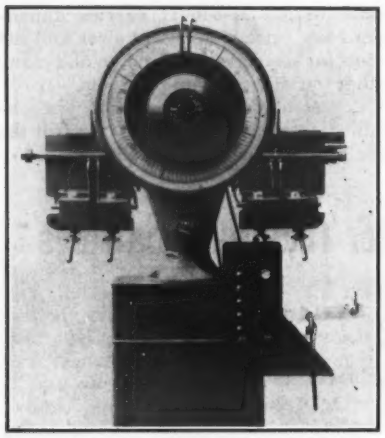

This Conveyco automatic weigh-batching unit has a dial scale with a single indicator hand and uses one photoelectric cell. It is adaptable to either semi-automatic batching or fully automatic operation.

## Weigh Batcher Uses Electronic Controls

An improved automatic weigh-batching unit has been announced by The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 11, Calif. The new Conveyco electronic unit uses one photoelectric cell. The dial scale has a single indicator hand.

Adjustment of weights for each type of aggregate is made from the front of the dial. Once set, batching to these predetermined weights is done automatically. As the arm on the dial scale reaches the pre-selected weight, a guided light beam sends a signal to the photoelectric eye activating the batcher bin gates.

The Conveyco unit is adaptable to either semi-automatic batching, or fully automatic operation. It can be used on ready-mix plants, asphalt plants, or portable batchers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 23.

## Ease of Adjustments Features Drawing Set

Of interest to draftsmen is a new drawing set made by Charles Bruning Co., Inc., 4754-18 Montrose Ave., Chicago 41, Ill. The instruments in the set consist of a beam compass with 8 and 13-inch beams, a 6-inch giant bow compass, a ruling pen with club-style wood handle, and a draftsman's refillable pencil which can be converted into a double-point pencil.

The Bruning beam compass has an exclusive patented feature said to provide rapid, simple, and positive adjustment of the needle and pencil blocks on the beam. The ruling pen has a patented calibrated adjusting collet that enables the user to regulate the opening of the nibs and at the same time record the desired setting for future use.

The giant bow compass has a patented adjustment for advancing the lead by turning the adjusting collar of the chuck. The compass will draw circles from 1/16 to 8 inches in diameter. The drafting pencil may be converted to a double-point pencil with an extra chuck and matching tip. The extra tip has been anodized, slightly changing its color to differentiate between degrees of lead being used.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 32.

## Lima Opens on West Coast

The opening of a new western office and warehouse has been announced by the Shovel & Crane Division, Lima Locomotive Works, Inc., Lima, Ohio. The new offices are located at 1315 Howard St., San Francisco 3, Calif. Paul Fenwick is the District Manager for this area. Ralph Rodgers and M. E. Army are the Assistant District Managers. Mr. Rodgers is located in the San Francisco Office and Mr. Army is located with their Los Angeles sales agent, the Smith Booth Usher Company.

## Air-Compressor Line Features Nine Models

A new line of two-stage air-cooled stationary air compressors is announced by the Sullivan Division, Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa. Unitair compressors are available in nine sizes with power requirements ranging from 15 to 100 hp. Piston displacements range from 81 to 590 cfm at 100-pound discharge pressure per square inch, based on 60-cycle motor speeds.

The compressors are made for three standard electric drives: built-in motor, direct-connected motor, and V-belt drive. Unitairs may also be equipped for use with gasoline or diesel engines. Because of their compact construction, they require only a small foundation.

Features claimed for the Unitairs are: force-feed lubrication through rifle-drilled oil passages by means of a positive gear-driven pump; cascade oil cooling to reduce oil consumption and oil sludging; low-lift, large port-area, direct concentric valves for high efficiency; low piston speeds for long life; oversize ball-type main bearings for low maintenance; four piston rings per piston mounted above the pin for oil economy and for long-lasting air-compression efficiency.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 4.


RUGGED STRENGTH FOR HEAVY HAULING

The m-h "25" Semi

★ 25 Ton Capacity
★ Tandem oscillating axles
★ All Welded Construction
★ Air Brakes

With electric welding throughout . . . sturdy steel construction . . . and careful attention to weight distribution, the M-H "25" is the ready answer to your heavy hauling problems.

Write for free descriptive folder!

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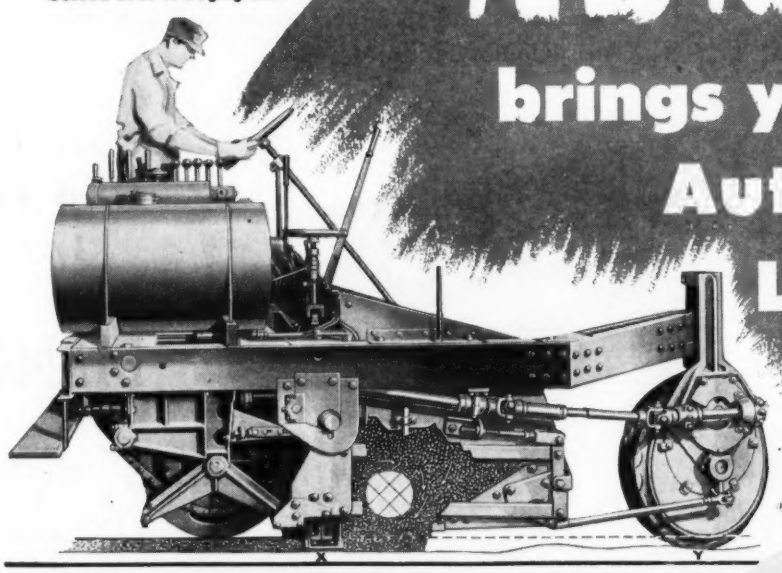
Photo diagram of Adnun showing material being fed to grade. Note that even if a front wheel falls into deep depression at *Y* the deflection of the Cutter Bar Screed at *X* is negligible.



the ADNUN brings you true Automatic Leveling

There are two important features responsible for Adnun's unusual accuracy in laying pavement. In the first place, the Adnun travels on the finished course, using it as a smooth template. In the second place, with the Cutter Bar Screed set close to the rear rollers and far back from the front wheels, there can be little deflection in the Cutter Bar even when the front wheels strike a major deflection.

There are no springs or floating mechanisms. There is nothing to tear the pavement and no special preparation of shoulders is required.

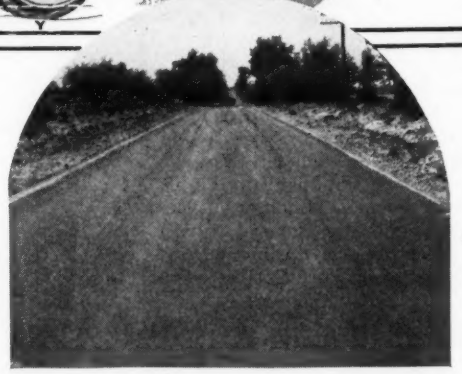
Adnun Continuous Course Correction is true Automatic Leveling. It means lower cost resurfacing of old pavement, less attention to the grading of subgrade and smoother black top roads. Don't buy a black top paver without checking into these details. Let us send you the whole story.

THE FOOTE COMPANY, INC.
1916 State Street, Nunda, New York

*Also See Page 91*

ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER

*Builders of* ADNUN BLACK TOP PAVERS, MULTIFOOTE CONCRETE PAVERS, AND FOOTE KINETIC MIXERS



Adnun fitted with the Adnun Carryall. These retractable wheels are supplied as extra equipment and make possible fast, easy travel between jobs or quick return to the beginning of the course.

"Oh, yeah, he's okay on th' diggin' but still a little green on loadin'!"

## Urges Study of Local Surfacing Materials

The shortage of materials for surfacing secondary roads has caused great concern among the highway engineers of Iowa. C. Coykendall, Administration Engineer of the Iowa State Highway Commission, reported this problem at the American Road Builders' Association meeting last February, in a paper on "Economics of Secondary Road Surfaces".

In the central and northern counties of the state, he said, the depletion rate of existing and known sources of local material is disconcerting. Some county engineers report that within a few years all known local sources of surfacing material will have been exhausted. Costs will rise as counties are forced to ship resurfacing material by railroad, or resort to extremely long truck hauls.

In the counties of southern Iowa, already practically barren of local surfacing materials, the problem is more serious. In some of these counties the cost of surfacing materials delivered on the road is from $3.00 to $4.00 per cubic yard.

A way may be found to finance construction costs at such prices. But annual maintenance resurfacing costs are such that the mileage of secondary roads that can be maintained as surfaced roads, with existing sources of revenue, is far below the mileage needed to give every rural home a surfaced road outlet.

At its annual meeting in 1944, the Iowa County Engineers' Association adopted a pertinent resolution: it requested the State Highway Commission to assign some competent engineer to devote his entire time to secondary-road surfacing problems in the state. The Commission complied with this request, and L. M. Clauson, one of the most widely experienced engineers in the Commission's Department of Materials and Tests, was assigned to the work.

Subsequent to this action, a Joint Board on Secondary Road Surfacing Problems was formed to plan and direct a research and experimental program devoted exclusively to secondary-road surfacing problems. It consisted of six county engineers appointed by the President of the County Engineers' Association, and three employees of the Commission.

### Bucyrus-Erie Dealers

Two new distributors for the Tennessee area have been appointed by the Bucyrus-Erie Co. of South Milwaukee, Wis., to handle its line of shovels, draglines, clamshell cranes, lifting cranes, and drag shovels. They will also handle sales and service for the Bucyrus-Erie line of tractor equipment for International industrial tractors.

Industrial Tractor & Equipment Co. will serve the central Tennessee territory from the Tennessee River eastward to and including Pickett, Overton, Putnam, White, Van Buren, Grundy, and Franklin Counties. Its headquarters are at 205 Eleventh Ave., South, Nashville 3, Tenn.

Power Equipment Co., 1218 Island Home Ave., Knoxville 15, Tenn., has as its territory eastern Tennessee, up to and including the Counties of Fentress, Cumberland, Bledsoe, Sequatchie, and Marion. It also maintains an office and warehouse at 600 W. Manning St., Chattanooga 5, Tenn. Western Tennessee will continue to be served by Road Builders Equipment Co. of Memphis.

### Blocks, Sheaves Described

A line of blocks and specialty equipment is described in Bulletin 47 of the McKissick Products Corp., Box 2496, Tulsa, Okla. Listed and pictured are many types of sheaves, construction blocks, floor blocks, snatch blocks, loading blocks, and wire-rope blocks. These include blocks with hooks, blocks with shackles, diamond-pattern blocks, and others. Prices and parts lists are given.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 71.


# A Roller For Every Job

Sturdy, heavy-duty rollers, engineered to stand up under the toughest conditions. Pierce-Bear Tandem Rollers are powered by economical Allis-Chalmers 4-cylinder industrial type gasoline engines. Variable weights, from 3½ to 5 tons with built-in water tanks for ballast and wet rolling.

Pierce Baby Bear 2½-3 tons

Pierce Medium Bear 3½-5 tons

The new 2½-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1½ inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.

**Pierce-Bear Rollers**

**Lewis Manufacturing Company**

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CARE-FREE BEARING PERFORMANCE THROUGH THE YEARS

It's been a good many years since the first Hyatt Roller Bearings were applied to contractors' equipment.

And today, carrying heavy loads in power shovels, scrapers, tractors, pavers, road rollers, graders and other machines, dependable Hyatts continue to serve and save.

With such long and care-free performance records to recommend them, no wonder Hyatt Roller Bearings are preferred and so widely used. If there is any application data you want, please ask for it. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

# Real Power Granted State Highway Chief

**Given Virtual Blanket Authority to Administer All Affairs Under Broad Policy O.K.'d by Commission**

✦ H. E. BAILEY, former Chief Engineer and now Director of the Oklahoma State Highway Department, has been given virtual blanket authority to run it under a broad policy outlined by the State Highway Commission. This was disclosed May 22 when rules and regulations adopted by the new Commission were filed with the Secretary of State.

The Commission reserved to itself only the right to require its approval on construction programs; Bailey is to have full administrative authority from there on. • •

Governor Turner said adoption of the rules and regulations was in line with his plan to make the new eight-member board a part-time commission which would serve to fix road-building policy but leave administrative policy and functions to the Director Engineer.

In a meeting which lasted through one day and well into the small hours of the next, the Commission gave Bailey full authority to:

1. Hire and fire employees.
2. To eliminate or change existing departments, and to establish new ones if necessary.
3. To determine work capacity of contractors, and to require that contractors furnish needed information.
4. To make purchase of materials, equipment, supplies, and right-of-ways; and to contract for other services necessary for operation of the Department.
5. To delegate to department heads the right to make emergency purchases, while maintaining the rule that competitive bids are required on expenditures of more than $200.
6. To execute contracts and agreements with cities and counties.
7. To delay advertisements of contracts until he determines plans are complete and approved for Federal Aid when necessary, and that right-of-ways have been obtained.

### Construction Programs

The new rules state: "Construction programs must be approved by the Commission. No contract, except for emergency construction, shall be advertised until it has been placed on the program. Separate programs shall be made as necessary in order to obtain Federal Aid, and in order to expend state funds available for construction. Program submissions to the Public Roads Administration will be restricted to a substantial amount of the Federal funds available to the state for any particular appropriation.

"Programs shall be formulated for the promotion of highway construction, improvements, and maintenance throughout the entire state," the rules say. "It is the policy of the Commission to construct and maintain a statewide system of roads, the location being governed primarily by their connection with through roads of the nation as well as important state highways."

### Employees to Be Classified

On personnel, the rules say that the Director is to submit from time to time to the Commission a classification of all department heads, engineers, professional, clerical, skilled, and semiskilled help, labor, and other employees, together with the rates of pay. And upon approval by the Commission the Director is authorized to appoint employees and fix salaries within the classification. Under the new rules, Bailey is given full supervision over all employees.

While he is authorized to act for the Commission on agreements with the Public Roads Administration to obtain Federal Aid, the program items are subject to approval by the Commission since they involve new construction.

Adoption of the new policy, it is believed, will increase efficiency in the Highway Department and make for a better state highway system.


# Again GM Diesel power pays off

**FEATURES OF THE GM DIESEL.**

**QUICK TO START—**
on its own fuel

**ECONOMICAL—**
runs on low cost fuel

**EASY TO MAINTAIN—**
clean design plus accessibility

**COMPACT—**
easily installed or moved

**SMOOTH IN OPERATION**

**QUICK ACCELERATION**

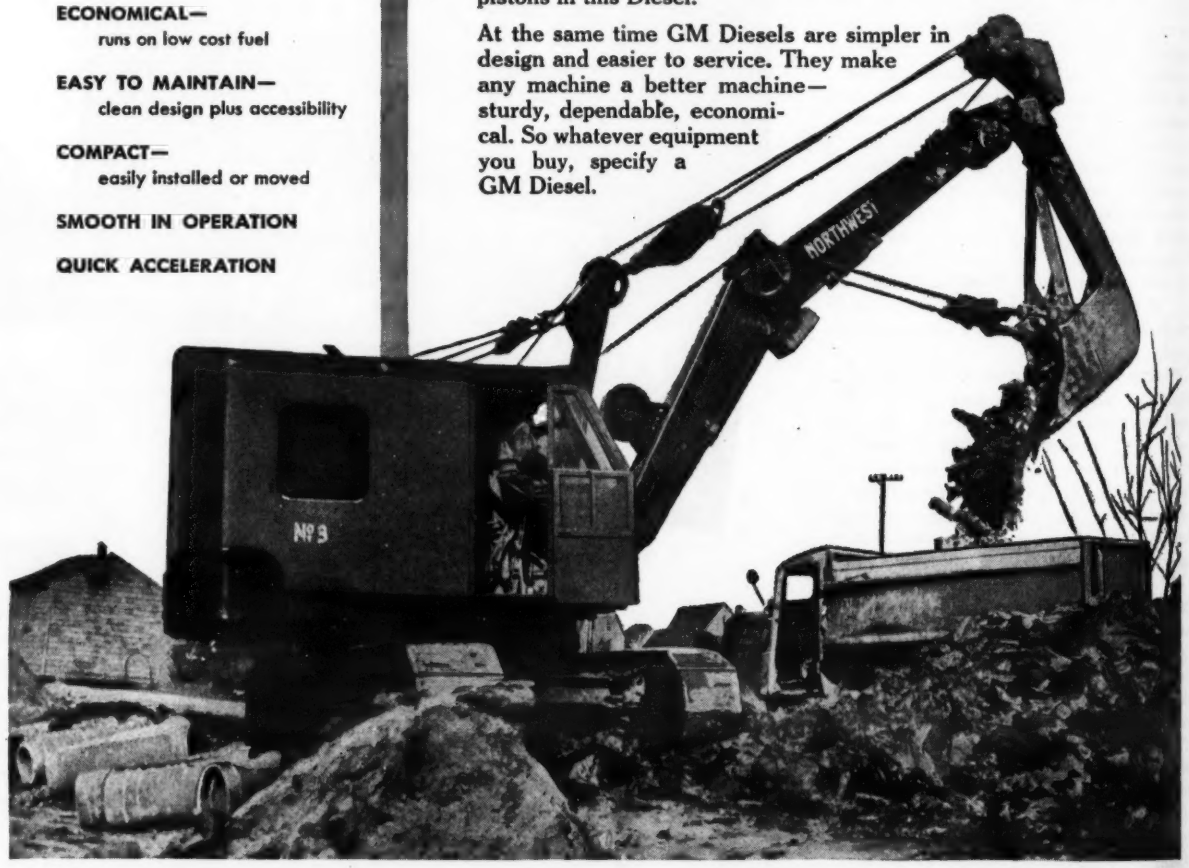
A 3-cylinder series 71 General Motors Diesel was installed in this Northwest pull-shovel which formerly was powered by a gasoline engine. Right off the bat it got one of the toughest jobs on the list—*6 miles of sewer, 8 to 17 feet deep through solid clay and frozen ground.*

It was a good chance to size up what the new engine could do.

It really walked away with the job—finished it well within the schedule—and cut fuel cost from a $7.00 a day average to $1.80.

Even with all its husky horsepower, a GM Diesel is compact enough to fit installations like this. That's because it's 2-cycle with power at every downstroke. It's all work and no play for pistons in this Diesel.

At the same time GM Diesels are simpler in design and easier to service. They make any machine a better machine—sturdy, dependable, economical. So whatever equipment you buy, specify a GM Diesel.

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DETROIT 23, MICH. • { SINGLE ENGINES . . Up to 200 H.P. / MULTIPLE UNITS . . Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

EIGHT Reasons Why

The La Crosse Wide Base Rim is the leader

More tread life . . . . reduced temperature . . . . fewer bead failures . . . less blow out hazard . . . . less sway . . . . compact tread . . . . lower tension . . . . economical operation.

HEAVY DUTY LA CROSSE TRAILER CORPORATION LA CROSSE, WISCONSIN Dealers in 48 states



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are located between pages 16 and 17, and 80 and 81 to request literature available to our readers without charge or obligation.

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**Contractors and Engineers Monthly**
**470 4th Ave., New York 16, N.Y.**

# Bids Too High; Dam Job Divided Into Smaller Units

## Contracts for Access RR, Quarry Boring, Diversion Channel, and Rolled-Earth Embankments Under Way

✦ CHANCES are that the actual construction problems of Clark Hill Dam on the Savannah River, 22 miles above Augusta, Ga., will be solved without too great difficulty. They should be easy compared to the obstacles that were and still are being surmounted to get the $45,000,000 project under way.

The Corps of Engineers is building the concrete dam with flanking earth embankments. First it faced opposition from southern utilities which claimed they wanted to do the work themselves. The Federal Power Commission decided that issue in favor of the Corps of Engineers. Next, a U. S. Court order was required to give the Government possession of land at the site. Two contracts were awarded successfully; one was for building an access railroad to the isolated location, while the other covered construction of the west embankment. But then progress struck a snag.

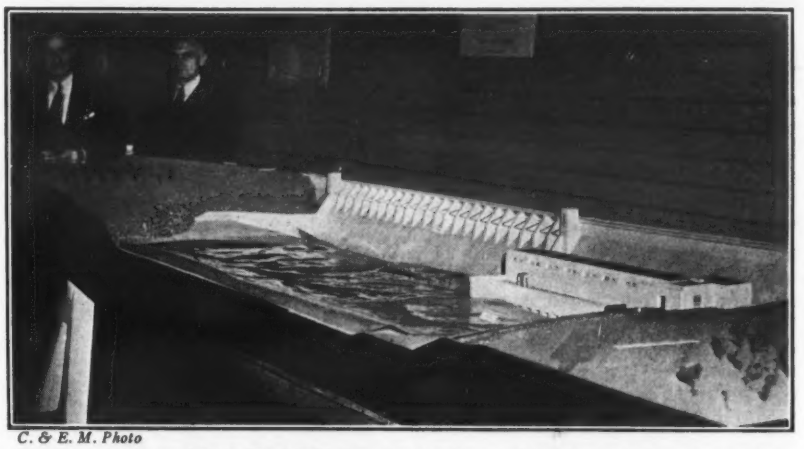
Bids on the principal contract for the gravity-section concrete dam, substructure for the powerhouse, and east embankment of the main dam were rejected on January 6 as too high. The low bid of Morrison-Knudsen Co., Inc., of Boise, Idaho, was $24,670,216 as compared with the Government estimate of $18,100,155 without profit. While only three other companies submitted bids, there were actually 20 different contractors comprising the four concerns bidding. Some of these were formed with just this one job in mind.

Hoping to lower the bids, the Corps of Engineers modified the specifications of the contract. It removed the cement item, fine and coarse aggregate, riprap, also all stone products, offering to supply these to the contractor. However, the results were the same, even to the same low bidder. This time the contractor's figure was $17,424,016 as opposed to the engineering estimate of $12,835,037.

It was felt that these high bids were caused by the contractors' desire to protect themselves against possible rising labor and material costs during the next few years. So the Government decided to divide the work into smaller increments. In this way individual contracts would be completed earlier and the risk of spiraling prices lessened. The 3-year period required to complete the project would remain the same.

### Multiple-Purpose Project

Clark Hill Project is named for the near-by tiny settlement of Clarks Hill on the South Carolina side of the Savannah River. It was conceived for a multiple purpose. It is the initial step in the development of the Savannah River for navigation, flood control, and hydroelectric power.



*C. & E. M. Photo*

**Here is a scale model of Clark Hill Dam in the Corps of Engineers Office at Augusta, Ga. Standing beside it are N. H. Siglow, Assistant Resident Engineer, and Torald Mundal, Resident Engineer.**

The Savannah River forms a boundary between Georgia and South Carolina. It also permits navigation, after a fashion, between Augusta and the seaport of Savannah 128 miles away. But the maximum depth of channel is only 6 feet part of the time, and quite frequently drops to a low of 3½ feet.

*(Continued on next page)*


The New DEPCO LIGHTWEIGHT PUMP

PROFIT BY SAVINGS IN TIME AND LABOR with the New Depco. Light enough to be easily carried. Surface pumping up to 4,000 GPH or 1500 GPH with 50 lbs. discharge pressure.

- COMPACT . . . Pump and engines directly coupled . . . no belts or gears.
- DEPENDABLE . . . Quick starting, new two-cycle 3 HP vertical shaft engine.
- STURDY . . . High-pressure aluminum die-cast engine with anti-friction bearings, stainless steel pump shaft.
- ONE MOVING PUMP PART . . . Cast bronze impeller, precision built to last.

Dealers inquiries invited . . . send for literature on Depco New Portable Self-Priming Pump.

DIESEL PUMP AND ELECTRIC MFG. COMPANY
Dept. E-2 • 110 W. Broadway • Glendale, Calif.



YOU, TOO, CAN SAVE MONEY with a truck like this

Here's a *"Job-Rated"* truck . . . a truck that FITS the hauling job for which it was built!

It stands to reason that a truck that fits its owner's operating conditions will give better performance, better service to customers, and operate at lower cost.

You, too, can buy a truck that will fit *your* job . . . save *you* money!

You can get a *"Job-Rated"* truck powered with exactly the right one of 7 engines—plus the *right* gear ratio—to provide the pulling power you need, with the economy you want.

Such a truck will be built with exactly the right clutch, transmission, rear axle—the right units throughout . . . for "top" performance with your loads over your roads.

You can be so sure of getting a money-saving, long-lasting truck like this, because Dodge builds 175 different *"Job-Rated"* chassis models.

To make sure that your next truck is a dependable, economical *"Job-Rated"* truck, see your Dodge dealer . . . because *only* Dodge builds *"Job-Rated"* trucks.

★ ★ . ★

Your Dodge dealer is interested in your continued satisfaction: *First*, by selling you a truck that fits your job; *Second*, by giving you prompt, dependable Dodge truck service; *Third*, by providing you with factory-engineered truck parts that are identical with original Dodge *"Job-Rated"* truck parts.

DODGE
ONLY DODGE BUILDS *"Job-Rated"* TRUCKS
Fit the Job . . . Last Longer!

# Dam Project

(*Continued from preceding page*)

With completion of the dam, the two important Georgia cities will be linked by an all-year channel 7 feet deep.

Regulating discharge of the water is naturally a flood-control feature as well. Chief flood protection will be for Augusta, Ga., and North Augusta and Hamburg, S. C., immediately below the site. Substantial flood benefits will also accrue to the lands along the lower Savannah River.

Initial power installation will consist of four units providing 160,000 kw; this can be increased by adding three other units to an ultimate total of 280,000 kw. Each of the seven turbines will have a capacity of 55,000 hp, and the generators 40,000 kw. The project will be larger than any existing hydroelectric system in the Savannah River basin. It is generally felt that enough power market demand will develop in the region to absorb all the energy the initial installation produces.

In conjunction with the project, recreational areas will be provided for parks, camp sites, and trailer cities which will be located on the perimeter of the great reservoir.

### Characteristics of Dam

At the site of the dam the Savannah River flows nearly due south through high bluffs, affording an ideal location for the structure. The length of the concrete portion will be 2,282 feet, while the lengths of the west and east earth embankments on either side are 2,069 and 1,329 feet respectively, for a total of 5,680 feet. The concrete portion and the east embankment are on a tangent, while the west embankment is at a slight angle.

*C. & E. M. Photo*

**First-stage core drilling in the core trench of the Clark Hill Dam west embankment consisted of 1½-inch-diameter holes, 25 feet deep, on 16-foot centers. Here a Sullivan No. 6 core-drilling machine works at the rate of about 2½ feet an hour in hard granite.**

The concrete section will have a maximum height of 200 feet and a maximum width at the base of 200 feet. On the earth embankments the maximum height is 155 feet, while the maximum base width will measure 880 feet. The concrete spillway section of 1,096 feet will have twenty-three 40 x 35-foot Taintor gates separated by 8-foot piers. The power plant will adjoin the spillway on the South Carolina side.

From the dam the reservoir will stretch up the Savannah River 37 miles, 29 miles up Little River in Georgia, and 17 miles up Little River in South Carolina. The total reservoir area when the pool elevation of 335.0 is reached will be around 78,000 acres. An additional 18,000 acres is being acquired to form a protective fringe around the reservoir, which will have a shore line of nearly 1,000 miles. From this area about 450 persons will be moved. Man-made structures that will be affected are 56 miles of highways to be relocated, 6 highway bridges to be raised, a railroad bridge and 58 miles of power line to be moved. The drainage area includes 6,144 square miles.

Across the top of the dam, which will be 37 feet wide, a new highway will connect Georgia State Route 104 with South Carolina State Route 28. This will provide a more direct highway between Atlanta and Columbia, the two state capitals.

A table of pertinent statistics on the dam and powerhouse follows:

| | |
|---|---|
| Total length of dam | 5,680 feet |
| Length west embankment | 2,069 feet |
| Length concrete section | 2,282 feet |
| Length east embankment | 1,329 feet |
| Maximum height, concrete dam | 200 feet |
| Maximum height, earth dam | 155 feet |
| Maximum width at base, concrete dam | 200 feet |
| Maximum width at base, earth dam | 880 feet |
| Concrete in dam | 1,053,000 cu. yds. |
| Earth fill in embankments | 3,725,000 cu. yds. |
| Spillway gates, 40 ft. long x 35 ft. high | 23 |
| Powerhouse length, initial construction | 454 feet |
| Powerhouse length, ultimate construction | 589 feet |
| Number of units, initial installation | 4 |
| Number of units, ultimate installation | 7 |
| Diameter of penstocks | 20 feet |
| Capacity of turbines, each | 55,000 hp |
| Head | 130 feet |
| Capacity of generators, each | 40,000 kw |
| Length of reservoir at 335.0 elevation | 37 miles |
| Shore line, approximately | 1,000 miles |
| Maximum depth | 160 feet |

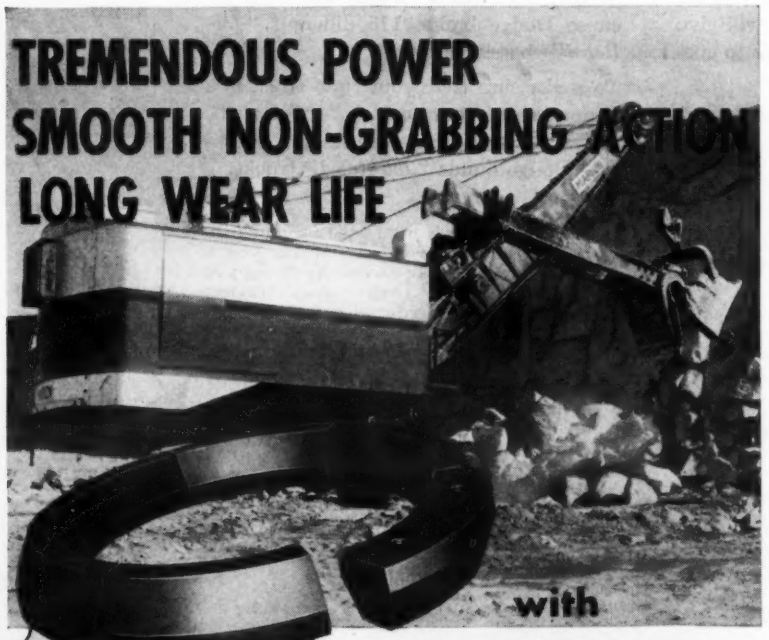
The plans and specifications for the dam were prepared by Charles T. Main, Inc., a Boston, Mass., consulting engineering firm.

### Active Contracts

In the isolated wilderness of the dam site, the first important consideration was to furnish a means of transportation for equipment and materials to be used in the construction. Accordingly a contract was awarded to W. T. Ander-

(*Continued on next page*)

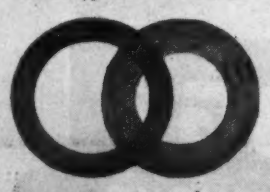

TREMENDOUS POWER
SMOOTH NON-GRABBING ACTION
LONG WEAR LIFE



with

GATKE Swing Friction for Northwest Shovel

Cone Type Clutch Facings



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GATKE Swing Frictions give you *plenty* extra. They take hold and release with *smooth, positive* action—*stand the heat and hold* when things get hot—give *longer* service with *fewer* adjustments. Use them for your next replacement and see what you have been missing.

Shipped from stock for popular Shovels, Drag Lines, Cranes, etc. Just order by make and model.

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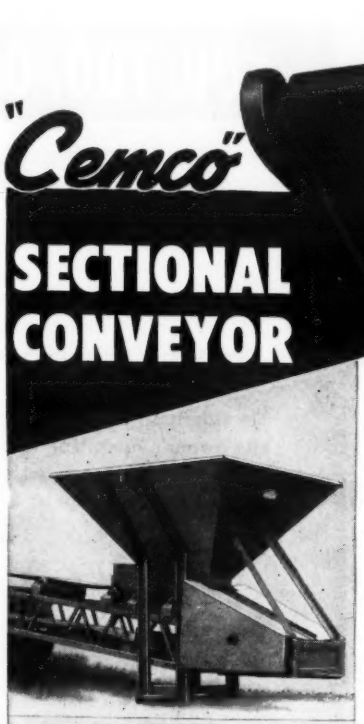

Shovel hoppers of two yard capacity can be quickly and easily installed.

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A heavy duty conveyor, the Cemco will readily handle rock, sand, gravel, coal, lime, and ore. Available in both portable and stationary units, a combination of sections may be added to the head and tail to make up a desired length. Your choice of 18", 24", 30" widths.

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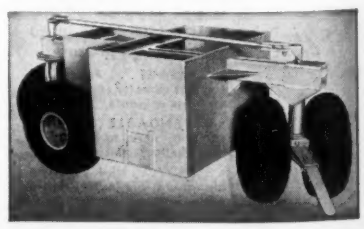
The Cemco Flat-Iron Roller's five pneumatic tires provide a compaction path of 72" to 75". Its low center of gravity permits work on shoulders and otherwise inaccessible places, even when loaded with 128 cu. ft. of sand. It smooths as it packs.



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# Dam Project

(*Continued from preceding page*)

son Construction Co. of Thomson, Ga., to build a 3½-mile access railroad line to the site. This railroad cost $193,487.00. It begins at Woodlawn, S. C., on the Charleston & Western Carolina Railroad which runs between Charleston and Spartanburg; it extends northward to the east or South Carolina side of the project.

This contract was beset with many difficulties, chief of which was the material shortage. As the contractor found it impossible to procure the required 90-pound rail, the Government issued a supplementary agreement to the contract whereby it would furnish the rail and a portion of the ties.

The necessary material was obtained from various Army training camps, now abandoned, but the freight-car shortage delayed shipment considerably. Heavy rains in the early part of the year also hampered construction so that the line was not fully completed until May.

In the meantime a contract for construction of the first stage of the west earth embankment was awarded to the Boyle Construction Co. of Sumter, S. C., on its low bid of $240,720. Fourteen bids were submitted for this job on which the Government's estimate was $285,421.00. The work got under way in January, and is described in more detail later on.

When the bids for the main dam and east embankment were twice rejected as too high, the Corps of Engineers began to break down the main contract into smaller items. It had previously explored the area carefully in a search for suitable aggregate, since the contractors seemed especially doubtful of their ability to procure the necessary stone. Within ¼ mile (center of gravity haul) from the west embankment, an excellent intrusion of granite was discovered under about 35 feet of overburden. Samples were taken from this Georgia quarry area just south of the dam. And after a laboratory analysis, the material was deemed suitable for processing into both fine and coarse aggregate.

The Jones Core Drilling Co. of Dallas, Texas, has been awarded a $51,550 contract for exploratory borings at the location and a 25-foot exploratory face 300 feet in length. Overburden from the area will be used as borrow in the construction of the west embankment. Later bids will be received on a contract to supply aggregate for the concrete, and also other stone products, all to be processed at the quarry site. The material will either be delivered to stockpiles or directly to the concrete mixers.

Construction of the east embankment was subsequently awarded as a separate contract on February 15 to Cherokee, Inc., of Columbia, S. C., on a low bid of $630,465.00. This breakdown of the big contract was producing the desired results. Ten of the 16 bidders for the work were under the Government's estimate of $799,497. The principal item, 1,500,000 cubic yards of borrow excavation, went for a unit price of $0.218 as compared with $0.332, the engineers' estimate. The price of the original bid on this item when it was included in the main contract was $0.55.

Before any cofferdam work could be attempted, the main river channel had to be changed by digging a diversion channel along the east bank. The channel will also serve as the tailrace below the new powerhouse. When this section of work was removed from the main contract, the original intention was to excavate the channel by earth-moving equipment operating from the land. This plan was changed, however, when a low bid was received from the Atlantic Dredging & Construction Co. of Okeechobee, Fla., to do the job of hydraulic dredging. Accordingly this company got the job for $282,040; the Government estimate was $293,890. Dredging got under way in April.

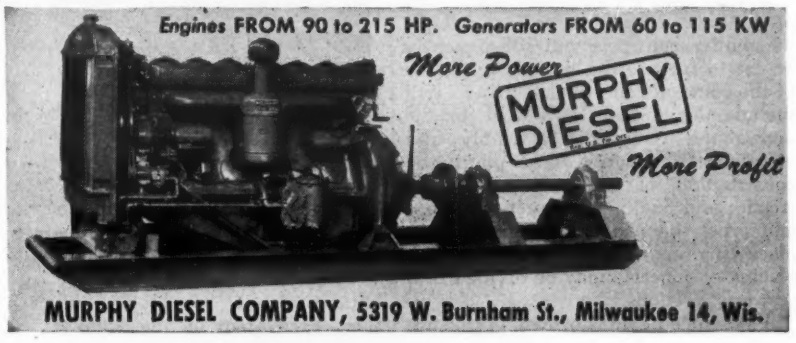
### Plan of Construction

The various contracts for the access railroad, west embankment, east embankment, quarry borings, and diversion channel have been active these first seven months of 1947. The concrete portion of the dam will be built within cellular sheet-pile cofferdams designed to pass 140,000 cfs of water. After the diversion channel has been dug into the left or east bank of the river, a first-stage cofferdam will be constructed. Within it the first stage of the west half of the dam will be poured. The Savannah will use the new channel for its course.

A contract has already been awarded for this first-stage cofferdam to the Hardaway Contracting Co. of Columbus, Ga., on its low bid of $844,200, as compared with a Government estimate of $858,790. Work could not start on the cofferdam until this month, when the contractor was promised a first shipment of 100 tons of steel sheet piling. Excavation in the west bank will extend from 25 feet above the flood plain to 30 feet below it. Some of the excavated material will be used in the closure section at the end of the west embankment where it joins the concrete structure.

After the west half of the dam is completed, the cofferdam will be removed and a new one constructed in the east half of the river. While the remainder of the dam is built, the water will be carried through the portion already built in eight 4 x 9-foot sluices within the structure; or else it will pass over the spillway section which will have been constructed in part to elevation

(*Continued on next page*)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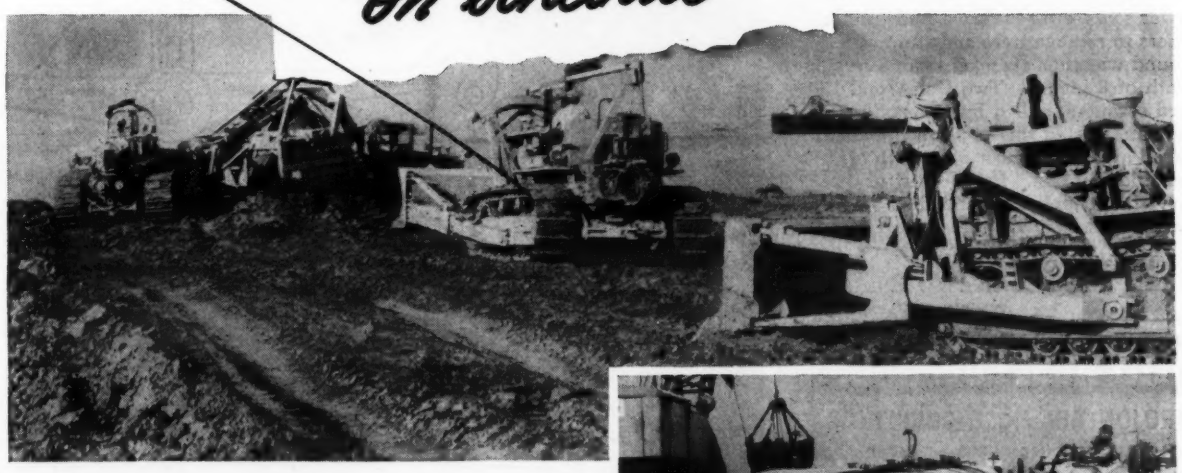

Walsh and Bates & Rogers have combined equipment and personnel to construct new coal docks at Toledo, Ohio, for the Baltimore & Ohio and New York Central Railroads. This $13,000,000 job involves moving 2,000,000 cu. yds. of earth, driving 15,000 wood pilings, 12,000 tons of sheet piling, pouring 25,000 yds. of concrete, and laying 60 miles of railroad track.

"GULF QUALITY LUBRICANTS AND FUELS have played a big part in our fast progress on this tough job," says S. C. Richards, General Superintendent. "In spite of punishing operating conditions, our equipment has delivered top-notch performance day in and day out—and we haven't had a serious mechanical delay."

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# Dam Project

(*Continued from preceding page*)

190.00. The elevation of the top of the dam will be 351.00. Because of the dam's great length, all concrete will be poured from a trestle, with the batch plant in all probability set up on the Georgia side of the project.

If the need for further breakdowns of the main contract continues, a series of smaller contracts will subsequently be let to include the remaining phases of the construction. Such contracts will include the building of a work bridge across the river; the assembly and erection of a concrete batch plant; the construction of a concrete-handling trestle; and finally a contract to supply and erect the necessary forms and to place concrete within them. Even the placing of concrete may be divided into east west sections.

A shortage of transformers is causing the Government engineers the greatest concern right now. Inability to get this important electrical equipment is a serious bottleneck to the smooth working of the project. No power lines touch the site directly. Four miles away is a 110,000-volt line, and 2 miles distant from the site is a 44,000-volt line. But transformers are needed no matter which line is tapped for the 5,000-kv substation which has yet to be built.

A construction village also must be set up to house key personnel both of the contracting companies and the Corps of Engineers. Such a village will include housing units, dormitories, and a cafeteria. As it is now, personnel must travel back and forth 22 miles each day to Augusta.

### West Embankment Contract

The first step in constructing the 2,069-foot west embankment was clearing the site. On this work the Boyle Construction Co. of Sumter, S. C., used power saws, crosscut saws, and tractor-dozers to remove trees and stumps. The ground was then stripped to an average depth of 8 inches. Two Gar Wood 15-yard scrapers, pulled by Caterpillar D8 tractors, wasted this upper stripping in a spoil area about 1,000 feet north of the embankment site. By the end of January the stripping was finished so that work could begin on the core trenches.

A core trench, 12 feet wide on the bottom with 1½ to 1 side walls, was then excavated to the solid granite gneiss. Because of the irregular profile of the rock, the depth of the trench varied greatly, with a maximum of about 30 feet. Below the stripped material lay a layer of clay, averaging 6 feet deep. It was removed by a fleet of six Super C Tournapulls pulling LP 12½-yard Carryalls. Since this material was to be replaced in the center of the embankment as impervious rolled-earth fill, it was moved only about 500 feet to either windrows or stockpiles on both sides of the trench.

*C. & E. M. Photo*

**From the land end of the Clark Hill Dam west embankment, we look down the core-trench excavation towards the Savannah River.**

When a course of weathered rock was encountered a couple of Ingersoll-Rand wagon drills and three Jackhamers drilled blast holes, as deep as 8 feet in places, through the weathered zone. Up to 40 holes were shot at a time. The mica-laden rock was unsuitable for use in the embankment since it could not be readily compacted. So it was wasted in the spoil areas. The Tournapulls also handled the removal of loose rock with the help of a couple of D8's for pull and push loading in the trench. About 50,000 yards were excavated from the trench. Final clean-up of the bottom

(*Continued on next page*)


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**TROJON AIR HOSE COUPLINGS**

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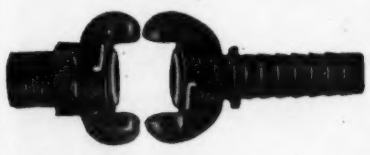

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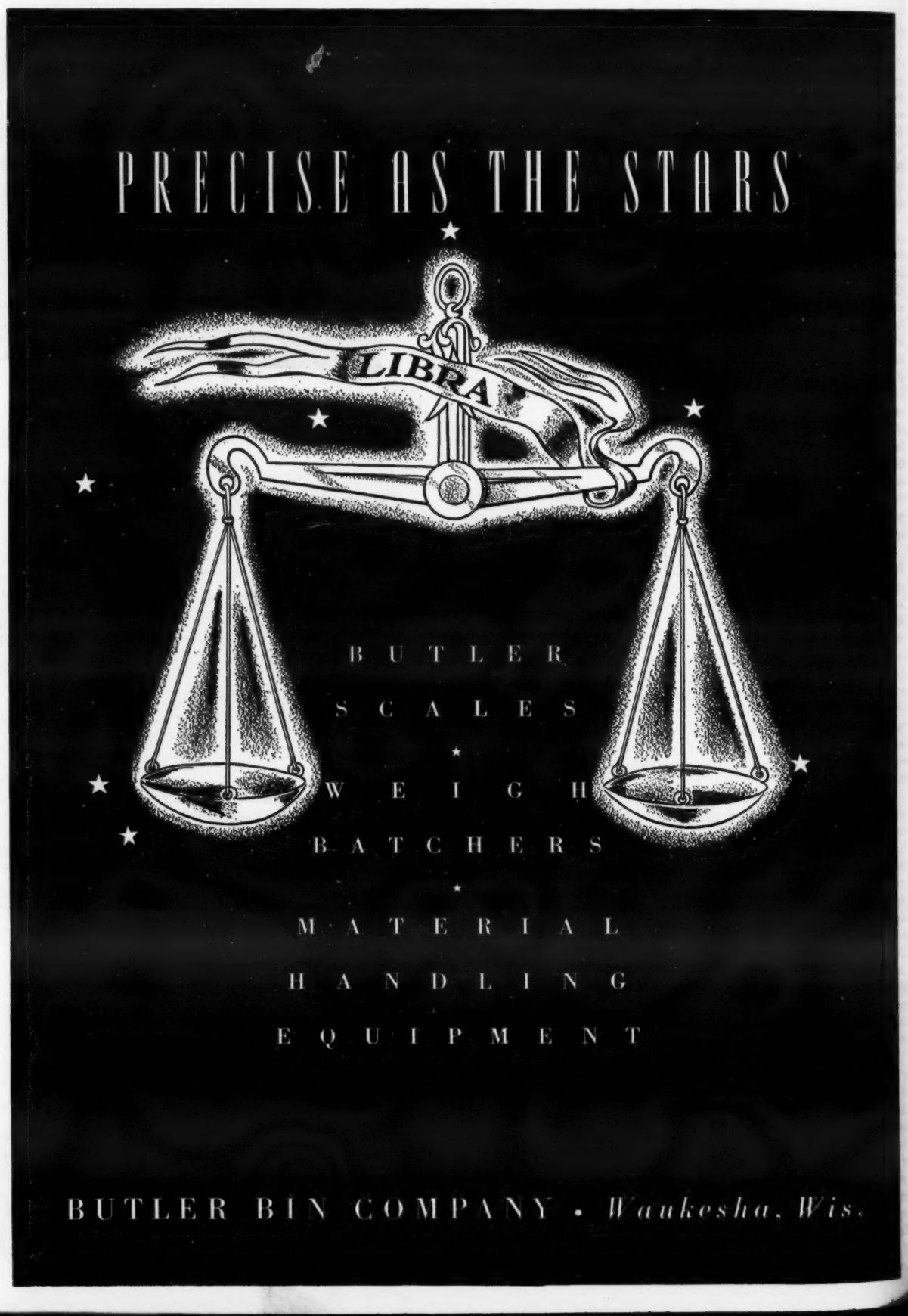

# Dam Project

(*Continued from preceding page*)

was done by a Lorain dragline with a 40-foot boom and a Page ¾-yard bucket.

The quarry site was then stripped to an average depth of 6 inches by the Tournapulls, which spoiled the material on the east and west sides of the borrow area. Four haul roads were built from the quarry site to the embankment by the tractor-dozers. A Caterpillar No. 12 grader kept them in shape. The upper 8 feet of material in the borrow was impervious and well suited for the core of the fill. The remainder of the overburden down to the rock is used for random fill in the rest of the embankment.

### Core Drilling

A subcontract for core drilling the trench was given to the Jones Core Drilling Co. of Dallas, Texas. The first-stage drilling consisted of 1½-inch-diameter holes, 25 feet deep, on 16-foot centers along the center line of the core trench. Two Sullivan No. 6 core-drilling machines powered by a Jaeger 315-cfm air compressor drilled holes in the hard granite bottom of the core trench at the rate of 2½ feet per hour. One-inch-diameter drill steel in 5 and 10-foot lengths was used with J. K. Smit & Sons EX 1½-inch diamond bits. Bits averaged 30 feet of drilling. Water for the drilling was pumped from the river.

The holes were filled with a mixture of cement and water. The contractor began with a 1:4 proportion mix and gradually increased the strength to a 1:1 mix. A Gardner-Denver pressure-grouting machine was used both for mixing and pumping the Lehigh portland cement and water at a pressure of about a pound per foot of depth.

As a rule the granite foundation was very tight and fairly devoid of seams, so that not much material was required. The average grout take was ½ bag of cement per linear foot of hole. The same procedure was followed for the second step of the first-stage grouting, with 16-foot center holes located midway between the first set of holes. At the end there was a grout hole every 8 feet along the bottom of the trench.

Finally, in the 400 feet closest to the concrete section of the dam, the first-stage drill holes were re-drilled in exactly the same location to a depth of 40 feet. Grout at the proper pressure for the depth was then pumped into these holes. This curtain of grout will prevent any water seepage into the foundation of the earth embankment. Before placing any fill in the trench the granite-rock foundation was well cleaned with picks, shovels, and jackhammers, to form a good bond with the earth work. The trench was also pumped dry before any fill was placed.

### Rolled-Earth Fill

The embankment section has an impervious rolled-earth-fill core extending from the bottom of the trench up to elevation 346.0, with 1 on 1 side slopes, and a 20-foot crown. Surrounding it is rolled-earth random fill built up to a 40-foot crown at elevation 351.0. The side slopes vary slightly, from 2 on 1 near the top, flattening out gradually through 2.5 on 1 to 3 on 1 near the bottom. Crushed rock will be placed on both side slopes, and on the pool side riprap will also be added.

The same procedures were followed in placing the two different types of fill material, and both random and impervious were spread and compacted at the same time when the equipment got under way. Spreading was done in 9-inch layers; these were compacted by sheepsfoot rollers to the required density at optimum moisture by standard Proctor tests. The sheepsfoot roller made at least six passes over each loose layer, and as many more as were needed to produce the required results. Two D7 tractors pulled McCoy dual 5 x 5-foot sheepsfoot rollers over the fill as water pumped from the river was sprayed on when necessary. Water was

(*Concluded on next page, Col. 2*)

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On the ½ yd. and ¾ yd. Shovel, Pullshovel and Dragline Buckets, all teeth are interchangeable—a great advantage to operators.
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All Purpose Sizes ⅜ to 2 yds.
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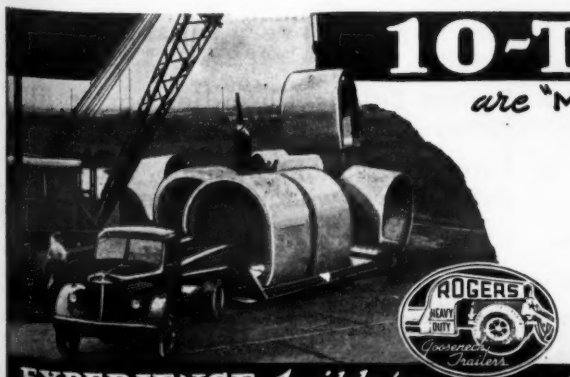


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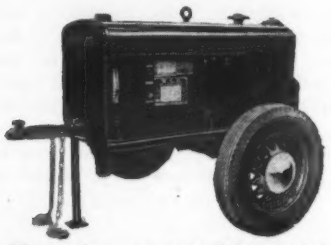

Shown here as a trailer-mounted unit, the new P&H WN-200 welder also comes equipped with skids.

## Portable Arc Welder Has 200-Amp Rating

A new arc-welding unit in either trailer or skid-mounted style is offered by the Harnischfeger Corp., Welding Division, 4400 W. National Ave., Milwaukee 14, Wis. The P&H Model WN-200 welder carries an NEMA rating of 200 amps; the manufacturer states that the welding service range is from 30 to 260 amps.

The WN-200 has Visi-matic calibration plates which enable the operator to select the proper welding current for each of three classes of electrodes. There is one control for obtaining any welding heat from minimum to maximum capacity.

The generator is rated 30 volts at 2,900 rpm. A heavy-duty 4-cylinder air-cooled engine of 26.5 hp supplies power. A 5-strand V-belt is used for positive power transmission. Gas-tank capacity is 10 gallons. The engine is rear-mounted for easy starting and to permit operation without unloading or unhitching.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 3.

## Book of ASTM Standards Is Ready for Distribution

The "1946 Book of ASTM Standards" can now be obtained from the American Society for Testing Materials. Published in five parts, it contains over 1,400 specifications and tests.

Part IA deals with ferrous metals; Part IB deals with non-ferrous metals; Part II covers non-metallic materials, constructional; Part IIIA covers non-metallic materials such as coal, petroleum products, textiles, gaseous fuels, etc.; Part IIIB deals with other non-metallic materials such as electrical insulating materials, plastics, rubber, paper, etc.

Each part of the 1946 book has a complete subject index. There are two extensive tables of contents: the first lists all standards under general materials headings; the second lists them according to the serial designations of the standards.

Part II sells for $12.00; the others for $8.00 each. A complete set of all five parts is $44.00. These prices are for cloth bindings; for half-leather, add $2.00 for each part.

Copies may be obtained directly from the Society, 1916 Race St., Philadelphia 3, Pa.

## Rock-Salt Bulletins

Descriptive literature on the use of rock salt for ice and snow control is available free upon request from the Cayuga Rock Salt Co., Inc., Myers, N. Y. This literature includes a descriptive folder and several information bulletins. The folder describes the use of rock salt and contains a chart showing the comparative values of salt vs. abrasive treatments.

Some of the topics covered by the information bulletins are: the use of rock salt alone to break ice bond; ice control with rock salt for saving man-power and equipment; and a testimonial from a town in New England.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 50.

## Dam Project

(*Continued from preceding page*)

carried in a 500-gallon tank mounted on a GMC truck.

### Quantities and Personnel

The major items included in the west-embankment contract are:

| | |
|---|---|
| Excavation, common | 74,000 cu. yds. |
| Excavation, rock | 2,000 cu. yds. |
| Excavation, borrow | 425,000 cu. yds. |
| Drilling | 6,400 lin. ft. |
| Compacted fill | 430,000 cu. yds. |

The Boyle Construction Co. completed its contract in June.

The Corps of Engineers has its headquarters at Augusta, Ga., where Torald Mundal is Resident Engineer and N. H. Siglow is Assistant Resident Engineer. A. C. Marane is Construction Engineer. Colonel Paschal N. Strong is District Engineer with headquarters at Savannah, Ga. This project is in the South Atlantic Division of the Corps of Engineers; Colonel G. W. Gillette is the Division Engineer with headquarters at Atlanta.


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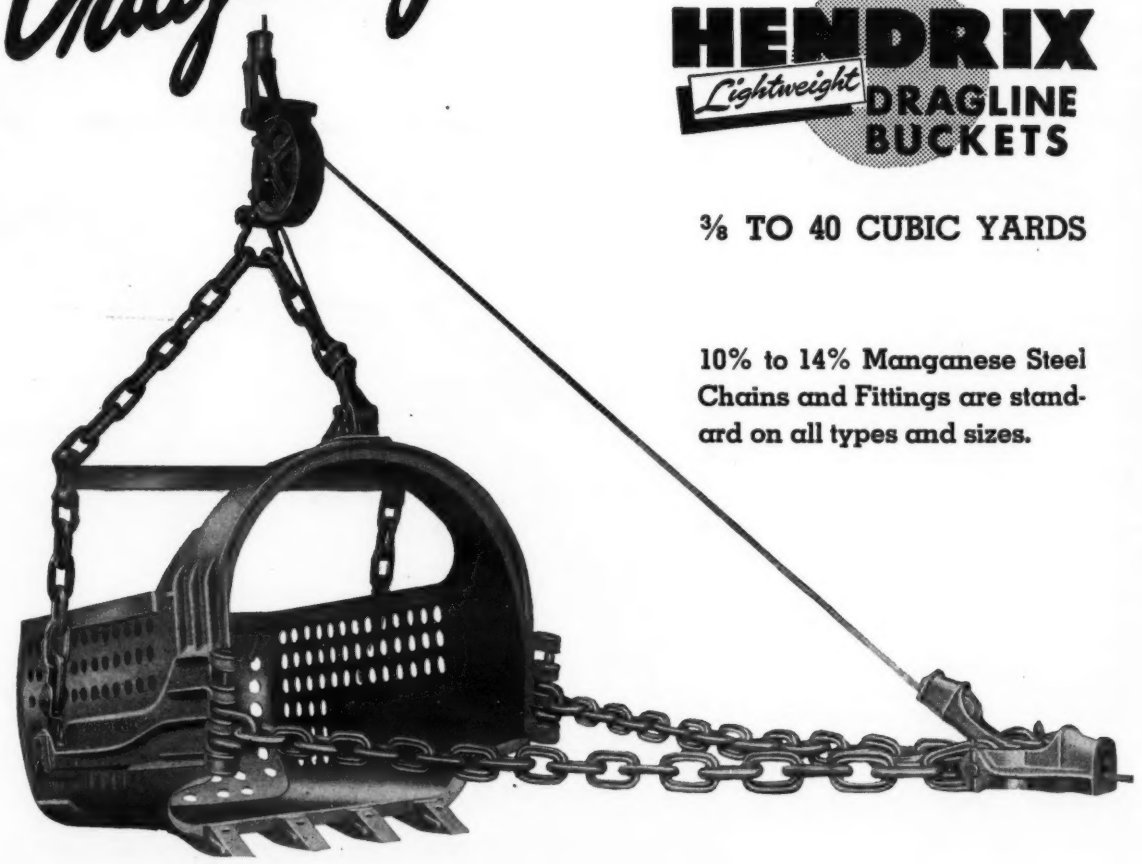

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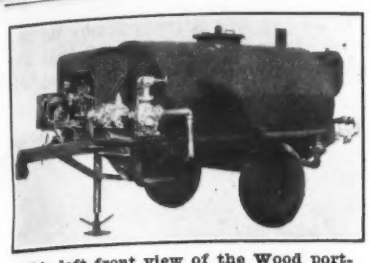

This left front view of the Wood portable supply tank shows the hitch and jack, the Ingersoll-Rand compressor for the heating burner, and the Chrysler industrial engine which drives the compressor and the Roper pump.

## Supply Tank Serves Traveling Mix Plant

A portable supply tank for use with road-mix machines is now obtainable from the Wood Mfg. Co., Box 620, 6900 Tujunga Ave., North Hollywood, Calif. Designed for use with the self-propelled Model 36 or Models 48 and 54 Roadmixers, as well as with other traveling plants, it is a 1,500-gallon single-compartment tank. It will carry all types of binder fluids.

A 3-inch Roper pump powered by a Chrysler industrial engine is mounted at the front of the tank. This pump is used for loading the tank, transferring fluids from tank to mixing drum on the Roadmixer or traveling plant, and for circulating fluids within the tank while heating. The tank is available without insulation or heating equipment, or with heating equipment only. A 24-inch manhole allows entrance for cleaning.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 43.

## New Kit for Bonding Brake Lining, Shoes

A new brake lining set which can be used for bonding brake lining to brake shoes has been introduced by The Raybestos Division, Raybestos-Manhattan, Inc., Bridgeport, Conn.

Features claimed for the Ray-Bond PG sets are: (1) an unchamfered segment with square edges serves as a scraper to remove grit and dust from the drums; (2) there is more brake surface due to the elimination of rivet holes and no possibility of drum scoring due to rivet heads; (3) because the brake lining can be used down to wafer thinness, its life is increased; and (4) Ray-Bond sets are furnished in the same combinations as the Raybestos PG sets except that they are undrilled. Ray-Bond sets are now available for most trucks and passenger cars.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

## Manganese-Steel Parts

A catalog giving complete specifications on its line of manganese-steel chains, sprockets, and other conveyor parts is being distributed by Taylor-Wharton Iron & Steel Co., High Bridge, N. J. The Tisco line includes manganese-steel detachable-link chain, Series 800 and 700 chain, Posselt combination chain, drag chains, drawbench chain, barking-drum chain, manganese-steel sprockets, and splitting sprockets.

The catalog lists all sizes available, prices, and miscellaneous information for ordering parts. It is punched for insertion in two-holed looseleaf folders.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 74.

## Represents American Hoist

William T. (Bill) Kennedy has assumed duties as Sales Representative for the American Hoist & Derrick Co., St. Paul, Minn. He will handle the southwest territory. His headquarters are at Houston, Texas.

## Highway Pavements Must Be Tailor-Made

The need for considering climatic, traffic, and subsoil conditions in the design of pavements was pointed out at the spring meeting of the American Society of Civil Engineers at Phoenix, Ariz. Donald J. Steele, Senior Highway Engineer, U. S. Public Roads Administration, San Francisco, spoke before the highway division. He pointed out that by a proper study of subsoil conditions, it is often possible and advisable to use a thinner slab.

"The major steps taken during the past 20 years in efforts to correct deficiencies in performance of concrete pavement have been to increase thicknesses of slabs", he pointed out, "and in some cases to add reinforcement and heavier dowel assemblies . . . The available evidence indicates that the greatest single cause of pavement failures in the past has been lack of adequate substructure."

In connection with studies of traffic use of highways, Mr. Steele suggested the following formula: that 50 or fewer trucks daily be established as very light traffic; 50 to 249 as light; 250 to 499 as medium; 500 to 749 as heavy; and 750 or more as very heavy. He advised the civil engineers to go still further in their studies of traffic. He advised them to take into consideration not only the number of commercial vehicles, but their weight and the type of commodities they transport.

He used charts to illustrate the need for studying each highway individually; these showed combinations which indicated that overall total thickness of surface and subsurface materials may range from only ½-inch surface treatment on excellent native subgrade for very light traffic, to as much as 24 inches on very poor native subgrade for heavy traffic.


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also
Asphalt and Tar Kettles
Portable Hoists
Generator Sets
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WRITE FOR DETAILS

Marvel Equipment Company
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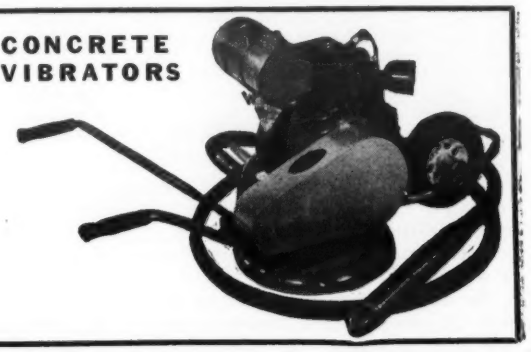
CHICAGO 4, ILLINOIS

CONCRETE VIBRATORS



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SERVING THROUGH SCIENCE

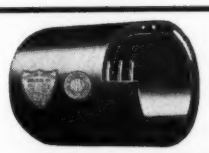
When You Need Suction Hose

You Really Need It!

Because suction hose is not used constantly on most construction jobs, many people figure that the cheapest kind of suction hose is good enough.

But we don't figure that way. We know that suction hose not only must take on-the-job punishment, but also the heavy abuse entailed in moving it from one job to another.

That's why you can be sure of "U. S." hose —from the large, heavy sand suction and discharge hose used in dredging operations right down to the everyday lightweight suction hose. Available at your equipment distributor or the nearest branch of United States Rubber Company.



U. S. GIANT SAND SUCTION HOSE.
Toughest abrasion-resistant tube. Powerful fabric and wire reinforcement. Sun and wear resistant cover. Smooth bore. Sizes 4" I. D. and up.

U. S. PEERLESS SUCTION HOSE.
For building construction and trench work. Maximum flexibility without danger of collapse. Smooth bore. 2" to 12" I. D.

U. S. RAINBOW SUCTION HOSE.
Lightweight hose for diaphragm pumps used in sewer and foundation operations. Rough bore. 1½" to 6" I. D. inclusive.

U. S. GIANT CONTRACTORS WATER SUCTION.
Smooth bore, wire-woven carcass abrasive resistant cover. Unusually lightweight. Easily reshaped if crushed or flattened. 1½" to 4" I. D.: Can be used for suction or high pressure discharge service.

U. S. ENGINEERED RUBBER PRODUCTS FOR THE CONTRACTOR
Air, Water, Steam, Suction Hose · Belts · Packings · Tape

This device for aligning the bottom of steel or wood forms is made by the Williams Form Engineering Corp.

## New Form Aligners

A new form aligner has been announced by the Williams Form Engineering Corp., Box 925, Madison Square Station, Grand Rapids 7, Mich. It can be used for aligning the bottom of steel or wood forms.

The anchor may be set at any point near the center of the footing at intervals of 3 or 4 feet. The parallel gage bars can be placed any time prior to the setting of forms, and adjusted to a chalk line for spacing of the forms. The manufacturer states that the aligner will also provide some anchorage of the wall to the footing.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 96.

## Benson Made a Director

The election of James S. Benson to its Board of Directors has been announced by the Chicago Construction Equipment Co. Mr. Benson is General Manager of the firm.

## New Curing Compound And a Rig to Apply It

A concrete-curing compound and equipment for spraying it has been developed by the S. P. Lyons Co., 1805 Courtney Ave., Los Angeles, Calif. It is known as Sure-Cure and is made as either a clear or pigmented compound. The company will sell it to contractors or subcontract the curing operations.

F. I. Lyons, Superintendent of Operations, has developed a machine for placing this compound on concrete canal linings. It is rail-mounted and travels along the same set of tracks used by the placing and trimmer machines. One man controls the spraying of the solution and at the same time controls the movement of the rig. Sure-Cure sealing solution is transferred to a 275-gallon storage reservoir on the machine. Briggs & Stratton engines with 1-inch centrifugal pumps are used to transfer and spray it, while the travel of the rig is controlled by a Briggs & Stratton engine and a Nelson engine.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 40.

## Power-Driven Hoist Units

A bulletin describing its line of hoists is available from the Universal Hoist & Mfg. Co., Cedar Falls, Iowa. Ideal hoists are made in two line capacities, 1,200 and 2,000 pounds, with either reversible or non-reversible drums. Diameter of the drum is 9 inches; length, 16 inches.

The bulletin has several photographs of the hoists mounted in various combinations and with various power sources. It explains that Ideal hoists can be run with sprocket-chain drive, belt drive, or direct gear drive. Engines of 5 or 8 hp are popular sizes, according to the manufacturer.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 51.

**Save Time and Money with a Whiteman RODDING MACHINE**

This portable Rodding Machine produces better concrete . . . rods the slab to a perfect level, compacted . . . ready for floating and finishing. Model "RS", for slabs 3 to 10 ft. wide. Also in Model 44, for slabs 10 to 20 ft. wide. Hand Grill Tamper at left, for tamping down larger aggregate, eliminates use of dry topping.

*Write for details and name of nearest distributor*

Whiteman CONCRETE EQUIPMENT
WHITEMAN MFG. CO.
3249 Casitas Ave., Los Angeles 26, California

OTC PUSH-PULLER removing rear wheel spindle on the Diesel No. 12 Motor Grader by pushing it through bearing. Savings in costly parts, labor and "lay-up" time on jobs soon pay for OTC TOOLS.

OTC MAINTENANCE TOOLS

**Save CRITICAL PARTS from DAMAGE**

Why let your mechanics take chances with "hammer-and-hope" or "poke-and-pry" methods of removing and replacing bearings, gears, sleeves, sheaves, wheels, shafts and other close-fitting parts? The OTC PULLING SYSTEM provides the proper tools to do these jobs SAFELY, easily and quickly —in the shop or on the job. Approved by Hyatt, M-R-C, New Departure, SKF and Timken for use on their bearings.

**No. PE-15 Maintenance Set** for track type tractors, Diesel motors, road maintainers, power shovels, drag lines, etc. 2 GRIPOMATIC PULLERS (20 and 9-ton capacities), PUSH-PULLER with extra 22¼" and 16½" legs, Pulling Attachments, Heavy Duty BOX WRENCHES and 24" Tubular Handle.

Write for OTC Maintenance Bulletin showing time-saving OTC uses.

OWATONNA TOOL CO.
348 CEDAR ST., OWATONNA, MINN.



Altimeters for all preliminary surveys

How much money will this instrument save YOU? Preliminary surveys in 1/10th the time with accuracy better than 1 part in 1000.

Type SA-1: Range 4360' (-760' to + 3,600') in intervals of 2'
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Type SA-5: Range 15600' (-500' to + 14,500') in intervals of 10'

All models priced $200 complete with case, hand & shoulder straps, magnifier and thermometer. IMMEDIATE DELIVERY —see your dealer or write direct for descriptive folder.

AMERICAN PAULIN SYSTEM
*Manufacturers of Precision Instruments*
Altimeters

U.S. Savings Bonds are a good investment.
BUY THEM REGULARLY

# New Road Hewn Through Granite

## 40-Foot Roadway Gouged Through Telegraph Pass By Tractor Equipment, Drills, and Shovels

✦ TWENTY-FIVE miles east of Yuma, Ariz., the steady thumps of a churn drill and yammering jackhammers have been reverberating through Telegraph Pass. Western Contracting Corp., of Sioux City, Iowa, had the contract for widening and rebuilding U.S. 80 for the Arizona Highway Department. The new 7.75-mile strip, widened to 40 feet to bring it up to modern standards, will lead through lofty granite peaks and saguaro-studded valleys.

Known as Job F82(8), authorized under the Federal-Aid program, the new section of the Yuma-Gila Bend Highway was scheduled for completion by June 30, 1947. The Western contract, totaling $540,000, brought the new roadbed up to the line where select base and surfacing will begin. This work will be done later, under another contract.

Some 339,000 cubic yards of excavation was involved. More than 260,000 cubic yards of that was hard blue granite rock, seamed with the fissures of ages, some glistening with brilliant quartz nodules. Cuts as deep as 102 feet had to be made. The terrain through Telegraph Pass is so rough that highway engineers have shied away for years from the terrible job of running location surveys. It is one of those good tough jobs in the wide open west where hard men tighten the tracks on their tractors, and say a prayer before they start.

Now the excavation machines have done their work. The bridges in the contract have also been widened to 40 feet to take the new speedway. That work was done in the warm-up period from June to December, 1946.

But the real job was the rock . . . 98 per cent rock.

### Drilling and Blasting

Arizona granite is tough stuff. It is hard to drill because it is seamed, and the seams lie at all kinds of angles. It is tricky to load because the fissures will absorb the concussion of an explosion. It is discouraging to handle because it is abrasive. It ravels off the sides and seams enough to stick drill steel, and make springing unpredictable.

A Bucyrus-Erie 29T blast-hole drill put down holes to shake loose heavy cuts. Using 6⅝-inch-diameter bits, this rig sank holes on a 25 x 28-foot grid pattern. The large-diameter holes were drilled 5 feet below grade, and no closer than 10 feet in from the toe of the ¼ to 1 rock slopes.

Drill bits were used at a sharp penetrating angle, with a small water course, and a fair reaming edge to play against seamed formations. They were sent in to Phoenix to be resharpened.

Drill holes were cased to solid formation, and water for the drill mud was skidded on a sled-mounted tank up the mountainsides, by the same Caterpillar-D8-mounted bulldozer that pioneered a path for the drill. Striking about 47 blows per minute, the Bucyrus-Erie 29T drilled about 5 feet of hole per hour on the average. A few 36-foot holes were drilled in an 8-hour day, after moving the rig and setting it up. The sturdy construction of the steel derrick on this rig makes it possible to drill a hole without anchoring guy wires off to the side.

Blast drill holes were sprung with about 30 sticks of 40 per cent Hercules stick dynamite, and then re-sprung with 70 sticks. There is little ground water in these somber red mountains, so Herculite 40 per cent bag powder was used for loading the main shots. The average explosive ratio was ¾ pound of powder to the cubic yard. But in extremely solid rock this figure dropped slightly, and in badly seamed formations it had to be increased to 1 pound to insure breakage. All blast-hole shots were pulled with Primacord.

Breakage behind the blast-hole drill was so thorough that the cuts could be ripped loose by bulldozers and loaded in scrapers.

A battery of five Gardner-Denver wagon drills was also brought in early in the job, and put to work. Powered by a 500-cfm Gardner-Denver compressor and an Ingersoll-Rand machine of the same capacity, these drills sank 24-foot steel with bits of 3-inch-minus diameter.

Timken detachable rock bits were used on wagon-drill and jackhammer work. Wagon-drill bits gave from 2 to 6 feet of drill travel, with 4 feet a fair average. They were sent to the Allison Steel Co., in Phoenix for resharpening, and lasted through five sharpenings. After the first sharpening, the drill bits lost gage rapidly and had to be used

(Continued on next page)

*C. & E. M. Photo*
**This Bucyrus-Erie 29T blast-hole drill put down holes to shake loose heavy rock cuts on the U.S. 80 project. It is shown here working on a 50-foot hole.**

HARMS BROS. CONTRACT, CALIF. STATE HIGHWAY #24, CONCORD, CALIFORNIA

**—with a fleet of FOUR Wooldridge Terra-Cobras**

Widening and straightening a narrow winding two-lane bottleneck is another typical job calling for Wooldridge high-speed, self-propelled Earthmovers. Working in a 700 foot cut at the summit of Willow Pass on California State Highway #24, four Wooldridge Terra-Cobras maintained an average of 920 cubic yards per unit, per shift, over a 5000 foot round trip cycle, down and back a 15 to 30 per cent grade. Loading was effected in less than 75 feet, in 33 to 39 seconds. Soft clay, sand and adobe was spread on an 1800 foot fill at an average speed of 15 M.P.H. For high hourly averages on long or shorter hauls, you'll profit by investigating Wooldridge Terra-Cobras, today. Write for complete data and performance details.

WOOLDRIDGE TERRA-COBRAS employ the same Bowl features as Wooldridge "Terra-Clipper" tractor-drawn Scrapers

**Measure Each Job in terms of WOOLDRIDGE EQUIPMENT:**

- ★ High Speed EARTHMOVERS
- ★ Tractor-drawn SCRAPERS
- ★ BULLDOZERS
- ★ TRAILBUILDERS
- ★ RIPPERS
- ★ POWER CONTROLS

WOOLDRIDGE
TERRA COBRA
HIGH SPEED-SELF PROPELLED
EARTHMOVERS

WOOLDRIDGE MANUFACTURING CO.
SUNNYVALE, CALIFORNIA
NATIONWIDE SERVICE

GENUINE ALL-METAL
Velvetouch
CLUTCH FACINGS AND BRAKE LININGS..
Now available for all tractors and earthmoving equipment. Immediate shipment. For prices and specifications see your local supply house, or write . . .
THE S. K. WELLMAN CO.
1374 East 51st St., Cleveland 3, Ohio

A drill crew tussles with tough Arizona granite, working atop a 90-foot cut (left, center) and against a sheer rock wall to bench down a highway cut (right). *C. & E. M. Photos*

# A New Road Is Hewn Through Hard Granite

(*Continued from preceding page*)

farther and farther down in the holes.

Wagon-drill holes were sunk on 15-foot centers, and sprung three times as heavily as possible before loading the granular powder. Detonation of wagon-drill holes was done by No. 6 electric blasting caps and a stick of dynamite.

A 500-cfm Gardner-Denver compressor and a 210-cfm Ingersoll-Rand portable rig furnished air to ten Gardner-Denver S-55 drills. These jackhammers used maximum lengths of 20-foot steel, and Timken detachable bits. The jackhammer bits of 2⅝-inch-minus diameter were resharpened in the same way as the wagon-drill equipment, and drilling characteristics were about the same.

"But you can never tell," one tough little jackhammer man said. "A few days ago I hit a hard pocket of quartz and dulled 21 bits in a 20-foot hole! Of course, that's an unusual case, but sometimes that's the way it runs."

The S-55's averaged four 20-foot holes in the 8-hour shift they worked. The lighter jackhammers were generally used in the highest and most inaccessible places, benching the first cuts down to where heavier drills could go to the bottom of the cut.

The importance of getting to the bottom of excavation at the first drilling and blasting cannot be overemphasized. Seamed rock is hard enough to drill the first time, but if it is left halfway shaken loose by a shallow blast it becomes well-nigh impossible to drill or handle from then on.

(*Continued on next page*)


CUMMER

ASPHALT PLANTS

EIGHT SIZES

Up to 1000 Tons per day

DRYERS

Two-Fire and Internal Fire

30 to 100 Tons per hour

Electric Batch Timers

50 Years' Experience

THE F. D. CUMMER & SON CO.

EAST 17th & EUCLID

CLEVELAND 15, OHIO

*Two flat cars of WHEELER TANDEM ROLLERS roll east for delivery.*

WHEELER Tandem Rollers

*This illustrates a WHEELER TANDEM ROLLER compacting close to curb line.*

SPECIFICATIONS

**POWER:** Allis-Chalmers Industrial Model B gasoline engine, 4 cylinder. Brake horsepower—24.5 @ 1500 RPM, 27.8 @ 1800 RPM. Speeds—2 forward and 2 reverse. First gear—1.55 MPH @ 1500 RPM, 2.55 MPH @ 1800 RPM. Second gear—2.75 MPH @ 1500 RPM, 4.00 MPH @ 1800 RPM. Continental and Hercules engines also furnished.

**DIMENSIONS:** Wheel base 7'10". Length overall 10'7". Width overall 3'6". Tank height 4'0". Ground clearance 10". Left side clearance 1½".

**COMPACTION ROLLER:** Width 36", diameter 37". Rolled and machined from ⅞" stock.

**STEERING ROLLER:** Width 34", diameter 27" Rolled and machined from ¾" stock.

**COMPRESSION Per Lineal Inch:** Compaction roller, 150 lbs. with ballast. Steering roller, 70 lbs. with ballast.

**SPRINKLER SYSTEM:** Gravity type. Tank capacity, 45 gallons.

**WEIGHTS:** Shipping weight (approximately) 5400 lbs. Maximum weight (with ballast) 8000 lbs.

Specifications and prices subject to change without notice.

***NEW DEALERS ARE BEING ADDED—CHOICE TERRITORIES ARE STILL AVAILABLE . . .***

WHEELER ROLLER

*Work with ease...*

The Wheeler 3 to 4 ton Tandem Roller will save you time and money on compacting jobs. The Wheeler Roller maneuvers in small areas with its short 7' 10" wheel base. It works comfortably within 2" of buildings; it rolls right to the curb with its 10" high frame clearance. A full working-width is compacted with the 34" and 36" steering and compacting rollers.

Convenient, quicker operation is provided by the Wheeler. Clear visibility on the right hand side permits the operator to see BOTH rollers at work, permitting hair-line operation. The easy operating hand wheel or hydraulic steering gives rapid, less tiring operation. The single-lever clutch moves the machine both forward and backward, allowing the operator immediate and precise control. Conveniently located, the foot brake quickly stops the machine, and a hardened steel ratchet locks the brake for parking. The parking brake is engaged or released by the tipping action of the driver's foot. Free access to all working parts is provided and it is easier for the operator to mount or dismount. This tandem roller is easily loaded and transported from job to job. The Wheeler is low in first cost and upkeep—more economical to operate. Immediate delivery is now yours.

*Write for the name of your local dealer; ask for the new 6-page 2-color folder giving complete information*

*A WHEELER TANDEM ROLLER shown doing an excellent compacting job near the Warner Bros. First National Pictures lot, Burbank, California.*

SHAW SALES & SERVICE CO.

5100 Anaheim-Telegraph Road, Los Angeles 22, California

*C. & E. M. Photo*
**Superintendent Justin Barber (left) and Resident Engineer Mulford Winsor, Jr., can still smile despite their problems on the Telegraph Pass job.**

# A New Road Is Hewn Through Hard Granite

*(Continued from preceding page)*

### Rock Removal and Fills

The roadbed is 48 feet in cuts and 45.6 feet in fills to accommodate a 40-foot finished roadway.

With the exception of a minor amount of borrow, the job was balanced between cut and fill.

Maximum hauls of a mile were handled by a fleet of eight end-dump Euclids, loaded by a Northwest 80-D shovel and another 2½-yard machine. The long-haul work was held in abeyance until some of the balanced rock work could be disposed of by tractor equipment within its effective hauling range of 1,100 feet.

The initial removal of several conglomerate cuts (approximately 55,000 cubic yards) was done under subcontract by two Caterpillar D7-mounted bulldozers and a K-30 LeTourneau Rooter with two teeth. A D7-drawn LeTourneau LP Carryall was also used. One of the most important rigs in that early pioneering was a hydraulically controlled LaPlant-Choate angling bulldozer mounted on one of the Caterpillar D7 tractors. The down pressure available on this blade helped to gouge out a bench on many of the otherwise inaccessible mountainsides.

The pioneering subcontract was done by Jack Foster of San Leandro, Calif., whose Superintendent, Justin F. Barber, was retained by Western Contracting Corp., to do its part of this extremely hard and hazardous work.

A total of eight Caterpillar D8 tractors, five of them with LeTourneau LP Carryalls, was used to dig blasted rock out of the short-haul cuts. With a pusher on behind, these rigs loaded broken stone well above the bowl edges, frequently heaping loads into the control cables and spilling material over the sides, surprising some of even the oldest cat skinners on the job. Without the pusher, the Carryalls readily picked up a water-level load of broken rock. Two of these Carryalls were at work when C. & E. MONTHLY's Western Editor looked at the project, and the other three were due to arrive very soon because blasting was rather well advanced.

The broken material was laid in fills in horizontal lifts generally about 12 inches thick, and equipment-rolled. Two Caterpillar D6's with sheepsfoot rollers were used to process any fine-textured material. Since watering this material would only run the fines down towards the bottom of the embankments, very little of that was done.

In a few sections on curves, the embankment had to be put in up to 47 feet wide to accommodate the additional curve width current on Arizona highways. The spiraling of all curves over one degree also allows a certain factor of safety.

### Equipment Service

Each day a service grease truck traveled the bulldozed access roads from the main highway back to the work. When the road stopped, bulldozers and Carryalls crawled down to be greased and fueled. Against a backdrop of drab red mountains they got the materials to sustain them for another shift.

With a rumbling and clattering of tracks, tractors dragged big steel sleds, 5 x 10 feet, back up narrow trails to the compressors. Loaded on the sled platforms were barrels of gasoline, drill steel, and bits. Eight hours a day six days a week this business went on, as the first great gashes appeared through Telegraph Pass far to the north of the present highway.

A heavy-equipment repair shop under the direction of Master Mechanic "Whiz" Holderby took care of the replacement of parts. He had other things to do, too.

"Hey, Whiz, go up there and see if

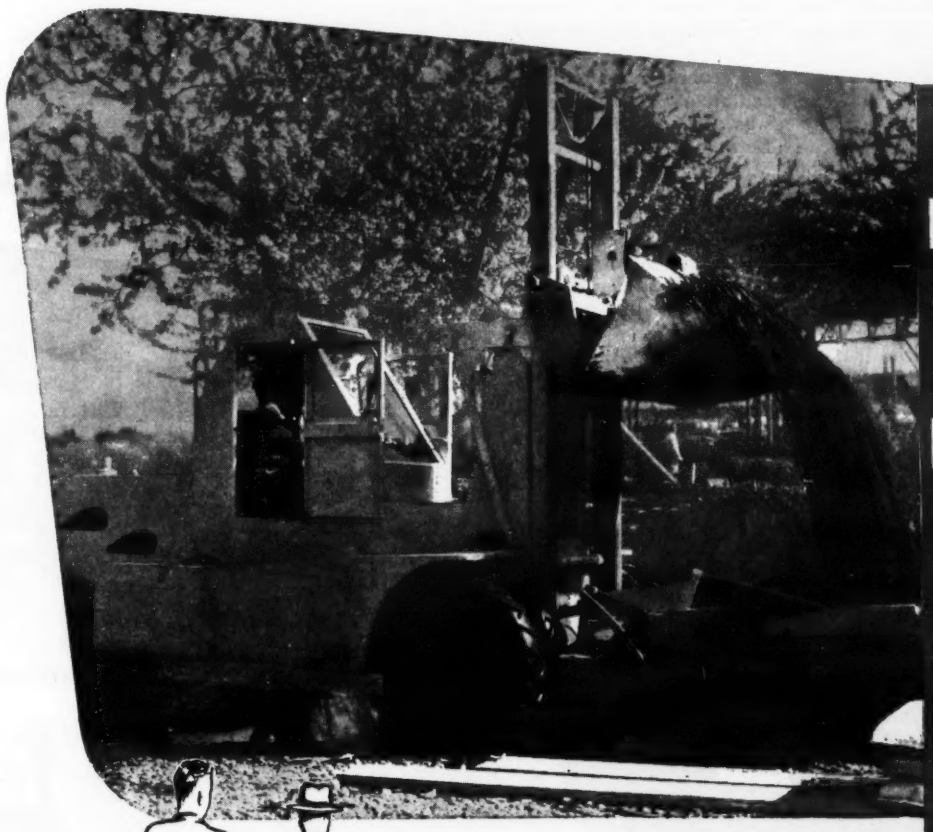
*(Concluded on next page)*

MULLER MIXER TRADE MARK

MANUFACTURERS OF

HALF-BAG MIXERS
CONCRETE CARTS
PORTABLE FARM MIXERS
FLOOR HOPPERS
MORTAR BOXES

MULLER MACHINERY COMPANY INCORPORATED
METUCHEN, NEW JERSEY



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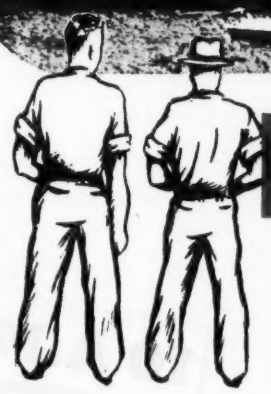


FEWER MEN
DO *More* WORK
*in Less Time*

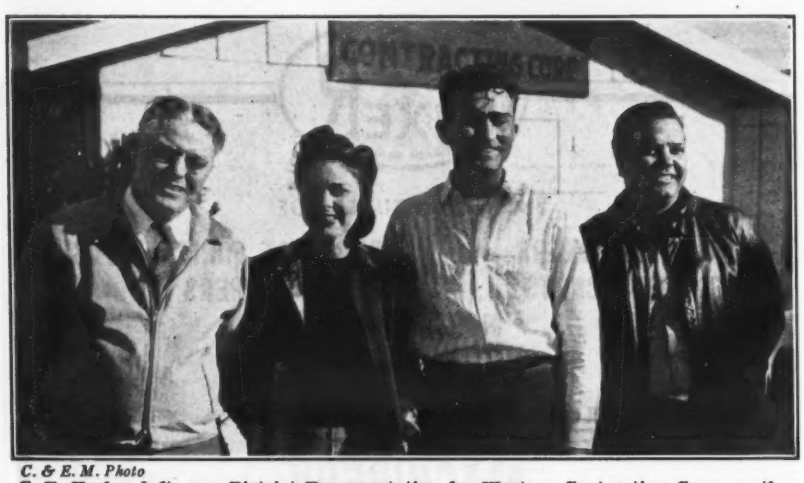
SCOOPMOBILE pays off on any construction or maintenance job that has bulk material to handle. Jobs are completed quicker . . . labor bills are less. *One man* and a Scoopmobile can load up to 80 yards of stock piled gravel, sand, or crushed rock an hour. Will lift 4000 pounds for discharge up to 7¾ feet. Extensions raise track height to 18 feet. Easily changed attachments include forks for lumber, steel, concrete pipe, blocks . . . crane boom for heavy equipment, concrete hopper, and buckets up to 1.08 cubic yards capacity. Scoopmobile is available with power steering and enclosed cab.

*Write Dep't CE for complete information and name of nearest dealer.*

TOWS FROM JOB TO JOB
Scoopmobile tows behind pickup or truck on any road. One man can do the complete job with a SCOOPMOBILE.

*with* SCOOPMOBILE

MIXERMOBILE MANUFACTURERS
6855 N. E. Halsey — Portland 16, Oregon



*C. & E. M. Photo*
**C. E. Kasler, left, was District Representative for Western Contracting Corp. on the Telegraph Pass job. Don Jackson, right, was the Project Engineer. Vance Cauble, center, was Office Manager, assisted by his wife Opal Cauble as stenographer.**

## A New Road Is Hewn Through Hard Granite

*(Continued from preceding page)*

you can get that one off its back!" was a familiar cry heard frequently around the shop.

Genial, ruddy Superintendent Justin Barber had to contend also with the routing of traffic through his job, for only 50 per cent was on this new location. The excavation problems were not so severe there, but much winter and spring transcontinental traffic uses U. S. 80, the southern route, and finding a way around for the automobiles caused many an hour of scheming. At one place, for instance, a drain culvert over the present highway allowed the contractor to place fill right over the old road while cars traveled through the future drain structure.

### Job Personnel

The job was directed by the Arizona Highway Department under the general supervision of W. C. Lefebvre, State Highway Engineer. R. C. "Smilin' Cy" Perkins is his Chief Deputy, James A. Parker is District Engineer, and Mulford Winsor, Jr., is Resident Engineer in charge of all field work.

Contractor's operations were under the general direction of District Representative C. E. Kasler. Dave Tucker was the Grading Foreman, Colonel F. Betz was in charge of structures, and Mr. and Mrs. Vance Cauble ran the office. Don Jackson was the Project Engineer. H. H. Everist, Jr., was Equipment Superintendent.

Superintendent Justin Barber and Resident Engineer Mulford Winsor, Jr., did not find the difficulty of the job a disadvantage.

They said, "With our Arizona winters, we have no desire for Heaven. With our summers, and the problems of this job to contend with, we have no fear of Hell!"

A timely point, gentlemen. . . .

## Equipment Identified With Decalcomanias

One solution to a contractor's or highway department's equipment-identification problem is the use of decalcomanias. This type of transfer is fast, easily applied, and readily recognizable. One manufacturer of decals is Palm, Fechteler & Co., 220 W. 42nd St., New York 18, N. Y.

The company manufactures eight different types of decalcomanias. These are divided into two broad general classifications, the cold and the ceramic (mineral). The decals can be made to reproduce lettering, trademarks, or any design in all sizes and colors.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 20.

## Cement-Box Distributor

A national distributor for the Hercules Turn-O-Matic cement box has been appointed by the Hercules Steel Products Corp., Galion, Ohio. Hereafter, national sales will be handled by the Dravo-Doyle Co., Pittsburgh, Pa.

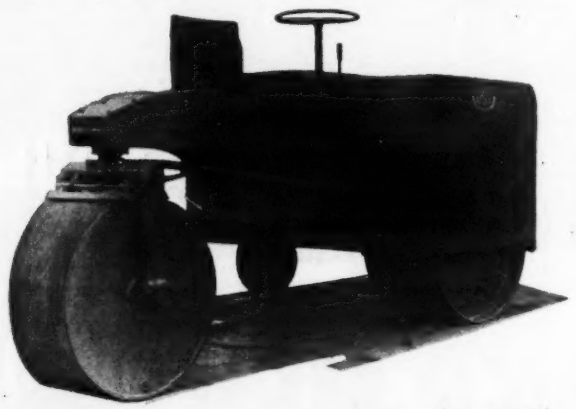
## Truck Operators' Magazine

Publication of the first issue of *Job-Rater*, a new magazine launched by the Dodge Division of the Chrysler Corp., Detroit 31, Mich., has been announced. It will be mailed free upon request to interested parties.

The purpose of the magazine is to provide factual and diversified information for truck owners and operators about trucks and their application. It will deal with cost-reducing truck operations, economical truck maintenance, and efficient truck service.

Some subjects included in the first issue are: how to win customers with trucks, two-way radios in trucks, and a review of how the Dodge trucks are job-rated.

Copies of this magazine may be obtained from the company. Or use the enclosed Request Card. Circle No. 95.

APSCO Presents a New Trench Roller

One of the highlight features of this new trench roller is the leveling wheel which is pneumatic tired, with adjustment by powered screw-type leveling unit.

Automotive-type steering gives unmatched maneuverability, allowing 45° turning radius. Two engine types are available, either Hercules or the Willys Jeep, with two speeds forward and reverse. Every journal is carried on Timken or Bower tapered bearings and is sealed in oil.

Roller is equipped with twin airflex or twin disc-type forward and reverse clutches. Front roll is 15″ wide and rear roll has width of 18″.

Write today for complete specifications of this modern trench roller.

The ALL-PURPOSE SPREADER CO.
ELYRIA, OHIO

ALL IN A DAY'S WORK

8 A.M.
• LOADING FROM STOCKPILE AT 8 A.M.

10 A.M.
• DITCHING 30 MILES AWAY AT 10 A.M.

The SCHIELD BANTAM travels on the highway at normal speeds. Drives right up to the job and starts to work without wasting time. Use it as a dipper, trench hoe or dragline. The BANTAM handles stockpile material at a rapid pace, digs ditches in varying widths up to 10′ deep, and works wherever larger heavy weight equipment is not profitable. Simple, centralized controls. Full-circle design. Perfectly balanced for easy handling. Interchangeable booms. Wide selection of attachments for fast operations. Complete unit weighs 4 tons. Mounts on 6 x 6 truck or half-tracks.

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SCHIELD BANTAM CO. INC.
Waverly, Iowa

BANTAM

SCHIELD BANTAM 1/4-YARD PORTABLE SHOVEL-TRENCH HOE-CLAM-DRAGLINE

The Pacific Type C sheave block comes in 8, 10, and 12-inch sizes. It is equipped with heavy-duty anti-friction sealed bearings and is of the quick-opening snatch-block type.

## Steel Sheave Blocks

Heavy-duty sheave blocks for the construction industry have been announced by Alloy Steel & Metals Co., 1862 E. 55th St., Los Angeles, Calif. The Pacific Type C sheave blocks are made with manganese-steel sheaves and side plates. They are equipped with heavy-duty anti-friction sealed bearings, and are of the quick-opening snatch-block type.

Sheave rims are recessed into the side plates to prevent rope fouling and to reduce rope wear. The rope channel of the sheaves is wide and deep, and the throat of the block is said to be wide enough to pass a square knot in wire rope. Hooks, shackles, and yokes are made of alloy steel. The Pacific Type C is made in 8, 10, and 12-inch sizes. It is available with hook, safety shackle, or safety swivel shackle.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.

## Air Tool for Tamping

An unusual application for its pneumatic pavement breaker is reported by the R. P. B. Corp., 1517 Santa Fe Ave., Los Angeles 21, Calif. With a special tool inserted in the hammer head, the breaker is adaptable as a tamping unit in locations where it is difficult to use the usual tamping equipment as on canal slopes, trenches, backfill for bridge abutments, and similar projects.

The R. P. B. heavy-duty unit is truck mounted, while the junior models can be purchased for mounting on a truck or on three-wheel trailers. The trailer types are a self-mobile unit as they are equipped with an air motor which propels the machine and also swings the boom. The recommended working speed of the hammer is from 55 to 60 blows per minute.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 5.

CANEDY-OTTO
DRILL PRESSES

8-SPEED — 21" STATIONARY HEAD SINGLE SPINDLE FLOOR DRILL — 1½" CAPACITY

The ideal general purpose drill, equipped with back gears and power feed, ratchet type lever feed, wheel feed and automatic stop. 8 Spindle speeds and 3 rates of power feed. Available with either tight and loose pulley drive for countershaft power take-off, or electric Vee belt, or geared motor drive. Capable of close, precision drilling. Rugged one-piece semi cast steel construction. Accurately machined table and base. Table pivots, swings 360° around column. Write for full details.

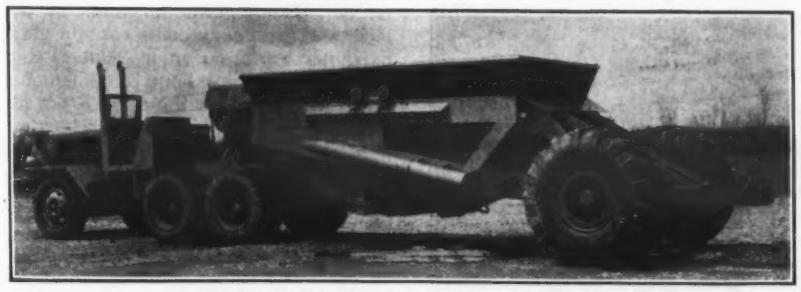
CANEDY-OTTO MFG. CO.
Chicago Heights 1, Ill.

## Wagon Has Clamshell Type of Bottom Dump

A 16-yard earth-moving wagon which features a clamshell-bucket type of bottom dump is being produced by the Dixson Mfg. Corp., 2623 Oak St., Kansas City, Mo. It is claimed that this type of construction enables sticky materials, which tend to build up on the sides and bottom of the wagon, to be shaken loose by dropping the bucket halves together and then reopening them. The bucket mouth will open to an area 6 x 10 feet in size.

The clamshell bucket is opened by a single cable controlled by a single-drum power unit actuated from the trucks or tractor transmission. It may be opened to any degree of opening; it returns to a closed position by gravity, controlled by a spring-loaded brake.

This company is also manufacturing two models of truck-tractors for use with the Dixson wagon, thus providing a complete unit. Both truck-tractors are powered by a 260-hp diesel engine.

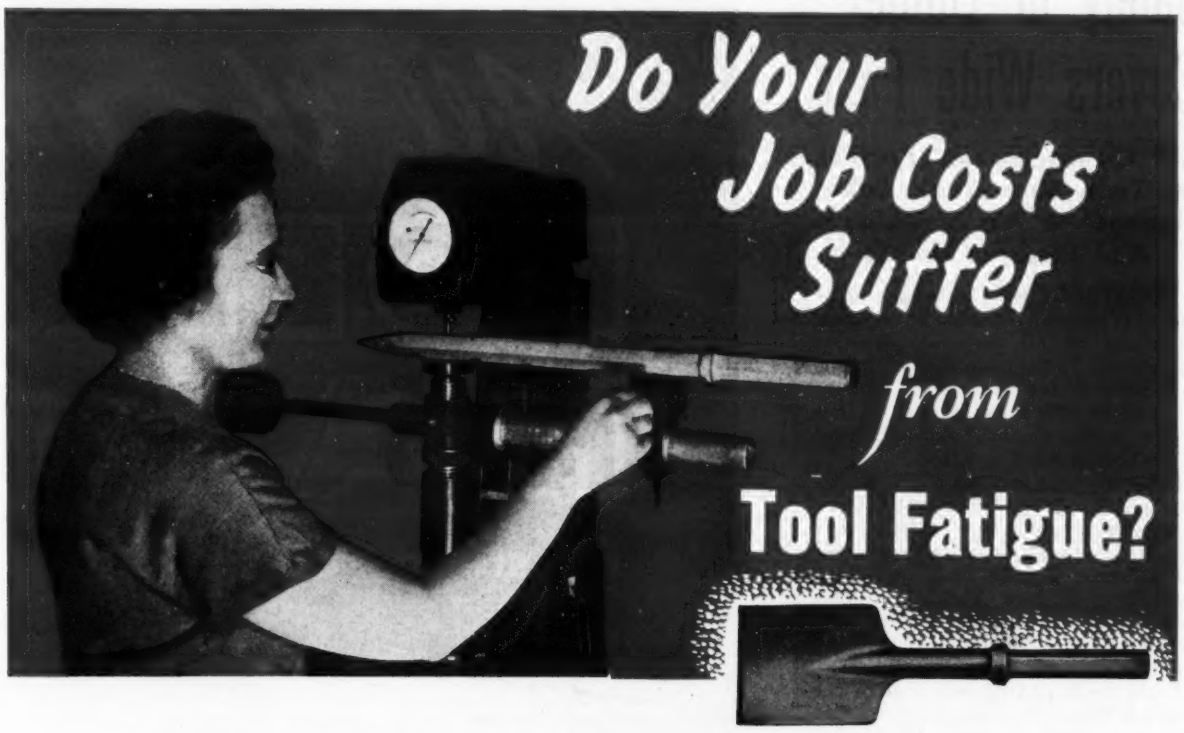


This complete dirt-moving outfit consists of a 16-yard bottom-dump Dixson wagon and truck-tractor specially designed for hauling it.

Their transmission, with a special overdrive, is designed for fast return of the wagon when empty.

The truck-tractor for the Model 250 is equipped with a tandem rear drive axle and specially designed tandem rear springs. The rear tandem driving axles are of the spring-suspended constant parallelogram type. Using the parallel torque system, the axles' vertical position is maintained regardless of their relative positions. This is designed to reduce the possibility of weight transfer, provide correct spacing and alignment under all road conditions, and permit efficient traction at all times, the manufacturer reports. The Model 140 truck tractor has an extra-heavy-duty single rear axle of the triple-reduction internal-gear type, with an 85,000-pound capacity.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 2.




Here is one of the many strength tests which ROCKBIT tools must pass while being manufactured. Such painstaking tests, plus rigid inspections, develop harder and tougher steels—and tougher steels mean longer tool life, less resharpening, lower job costs.

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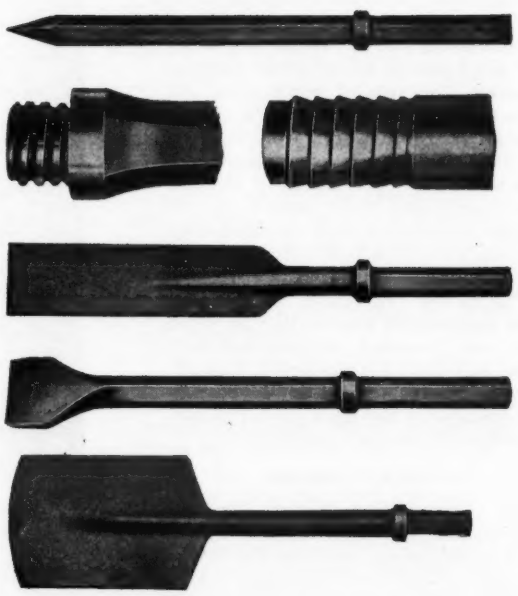

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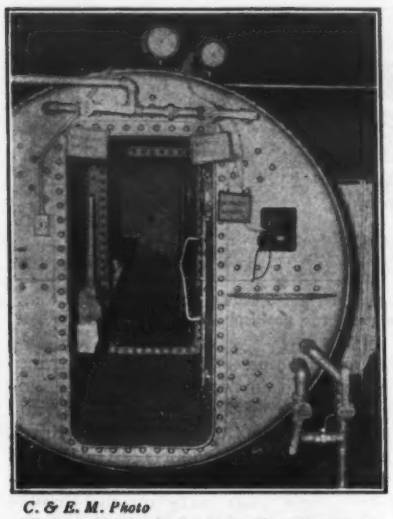

*C. & E. M. Photo*
**The medical air lock in the Mason & Hanger first-aid station has two compartments. The doctor can enter and leave via the outer one without changing the pressure in the inner one.**

# Safety in Tunnel Covers Wide Field

## All Construction Phases Of Twin New York Tubes Planned to Avoid Mishaps And Preserve Health

✦ CONSTRUCTING an under-water tunnel is generally considered the most hazardous of all heavy-construction operations. To maintain the health and well-being of the workers, so that the job can be efficiently carried on, demands careful planning and adherence to established safety practices.

Such practices are part of the every-day construction procedures of the two contracting firms now engaged in boring the river sections of twin vehicular tubes, nearly 2 miles long, under the East River in New York City. This Brooklyn-Battery Tunnel is being constructed by the Triborough Bridge and Tunnel Authority.

From the Manhattan side of the river Mason & Hanger Co., Inc., is driving two 31-foot-diameter tunnels. These pass through rock, with the exception of one short stretch of about 75 feet in the bottom drifts and about 125 feet in the full-sized tunnel where softer material demands the use of compressed air. (See C. & E. M., April, 1947, Pg. 2). The George H. Flinn Corp., working from the Brooklyn side, is using shields and compressed air over most of its contract, since the river bottom in this section consists mainly of sand, clay, and silt. (See C. & E. M., May, 1947, Pg. 6).

The safety procedures followed by both contractors are similar in scope. They are intended to eliminate accidents and maintain the health and efficiency of the some 1,600 employees who are engaged at the peak period of construction on the two contracts.

### First-Aid Stations

On each project, modern first-aid stations are maintained at the job site close to the tunnel shaft. At the Brooklyn end, where compressed air is continually used, a doctor is in constant attendance for round-the-clock operations. When compressed air is not required on the Manhattan side, a female registered nurse is in the first-aid house from 8 a. m. to 4:30 p. m. She is relieved by a male nurse for the night shift lasting until morning.

Both stations contain a medical air lock. This has two compartments so that the patient may be placed in the inner one, and the doctor can enter and leave via the outer compartment without changing the pressure on the patient. Bunks line the walls of the lock, and the heavy doors contain glass portholes for observation. Valves and pressure gages for both compartments are controlled from the outside.

Sand hogs are given a medical examination before being accepted for work. And their hours of labor are strictly limited according to the New York code of laws, depending on the air pressure to which they are subjected. When working under pressures up to 26 pounds per square inch, for instance, the shifts are 3 hours on, 3 hours off, and 3 hours on again for a total of 6 working hours in 24. Under 26 to 33 pounds of pressure, the shift time is reduced to 2 hours on, 4 off, and 2 on again for a total of 4 working hours in 24. From 33 to 38 pounds, which is the highest required on this tunnel, only 2 shifts of 1½ hours each may be worked, separated by a rest period of 4½ hours.

Ordinarily, when leaving the compressed-air tunnel face, the men remain in the air locks a minute for every pound of air pressure under which they have been working. Thus if the working pressure is 30 pounds, the men stay 30 minutes in the lock while the pres-

(*Continued on next page*, Col. 4)

**Derailing switches in the twin tunnels are open, in normal position, and must be closed by a switchman before a locomotive can pass with its loaded muck cars. Thus if a train should get out of control, it would leave the rails before it could crash into the bulkhead and air locks or into the tunnel heading.**


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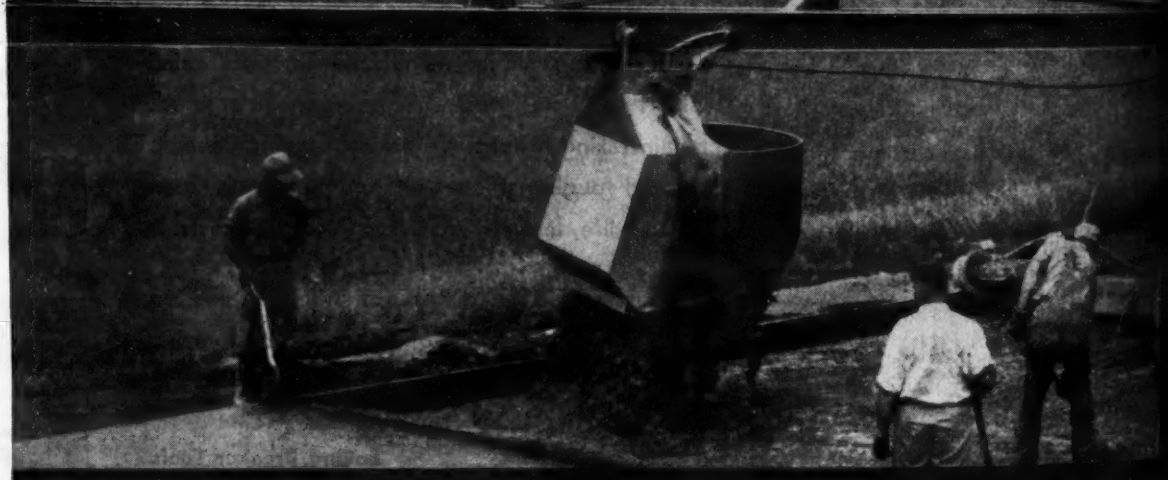
for steady output, speed and economy



GRADING TO FINISHING, IT'S KOEHRING FOR LOW COS

## Tie Clamps Space, Hold Reinforcing Steel Bars

Clamps for tying reinforcing bars are described in a bulletin issued by the Symons Clamp & Mfg. Co., 4249 Diversey Ave., Chicago, Ill. These clamps are made in two models; plain bar ties, and tie chairs.

The Symons tie chair is made in two sizes: Size No. 1 for tying and supporting any two intersecting bars whose combined diameter does not exceed an inch; and Size No. 2 for any two intersecting bars whose combined diameter is not less than 1⅛ inches, nor more than 1⅜ inches.

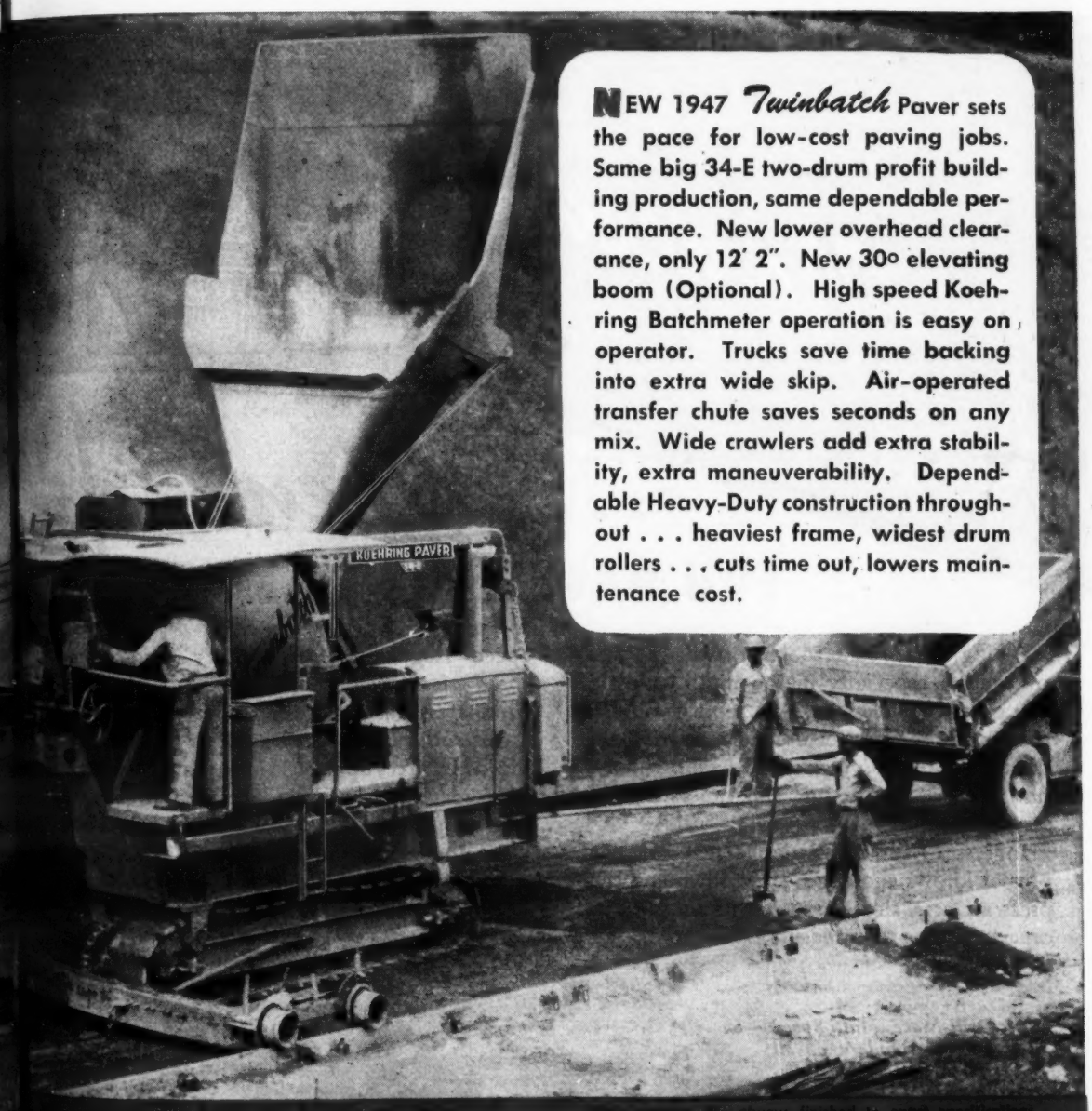
The Symons plain bar tie is made in four sizes: Size No. 0 for combined diameters not exceeding ¾ inch, Size No. 1 for those not exceeding 1 inch, Size No. 2 for those not less than 1 inch nor greater than 1⅜ inches, and Size No. 3 for those between 1¼ and 1⅝.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 64.

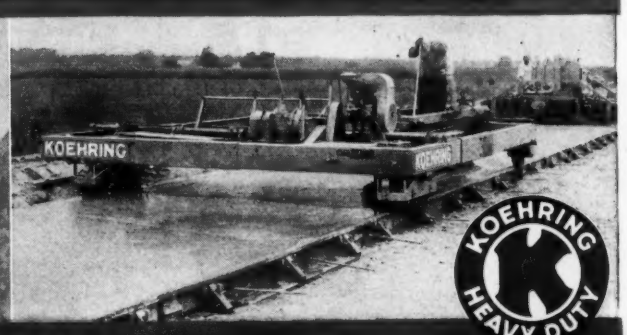
*C. & E. M. Photo*
**This stockade of double walls filled with sand surrounds a dynamite magazine on the Mason & Hanger contract for the Brooklyn-Battery Tunnel. The magazine itself is covered with a light wooden roof and a metal plate. It is painted a vivid red, and the word "Danger" is printed in large white letters.**

## Jackson Plant Completed

Its Vernon, Calif., plant has been completed and is now occupied, announces the Pump Division of the Byron Jackson Co. Erected at a cost of over $1,500,000, the new addition was built by the C. L. Peck Co.




NEW 1947 *Twinbatch* Paver sets the pace for low-cost paving jobs. Same big 34-E two-drum profit building production, same dependable performance. New lower overhead clearance, only 12′ 2″. New 30° elevating boom (Optional). High speed Koehring Batchmeter operation is easy on operator. Trucks save time backing into extra wide skip. Air-operated transfer chute saves seconds on any mix. Wide crawlers add extra stability, extra maneuverability. Dependable Heavy-Duty construction throughout . . . heaviest frame, widest drum rollers . . . cuts time out, lowers maintenance cost.




KOEHRING HEAVY DUTY

KOEHRING COMPANY Milwaukee 10, Wisconsin

# Safety in Tunnel

*(Continued from preceding page)*

sure is gradually reduced to that of free air.

A victim of the "bends", a compressed-air illness, is placed in the medical air lock where the pressure is brought to somewhat above that under which he has been working. He is then gradually decompressed over a time interval of several hours. This method of treatment usually cures all cases.

Men who work under air pressure wear a metal badge stating the nature of their occupation, and advising that they be taken to a medical air lock immediately should they become ill when away from the job.

### Vital Air

Air is compressed in the contractors' powerhouses located on the job site. To insure an uninterrupted flow of electricity to run the compressors, three different sources of power are available. Thus if one or even two electric-power feeders should fail for any reason, the compressors can still operate off the third line. The switches to control the compressor motors in the powerhouse are mechanically interlocked to eliminate any possible opening or closing of the wrong switch.

As the tunnel advances by the shield and compressed-air method, concrete bulkheads 12 feet thick are constructed across the tunnel; in these are embedded the material and personnel locks. These bulkheads are 800 feet apart, are airtight and are built to withstand the tremendous pressure of the compressed air.

Safety screens are maintained near the heading. Made of ⅜-inch steel plate backed by angles, they occupy the upper half of the tunnel area. They are meant to act as traps and to provide a pocket of air along the roof of the tunnel above the emergency runway on which the workers could reach the locks ahead of rising water.

Two screens are used; the first is erected about 70 feet from the heading. But as the shield advances and this gets farther away, another screen is thrown up. The first screen is then taken down and moved ahead when the distance from heading to screen reaches about 200 feet.

The emergency runway is a metal catwalk or flying gangway, 3 feet wide, extending from the locks to the heading for the use of the workers. This walk is hung from the cast-iron liner rings at the roof of the tunnel, and dips under the safety screens. It is suspended far enough above the tunnel floor not to interfere with the movement of muck cars on the 3-foot-gage tracks below. It also separates the lanes of travel of men and machines, reducing the danger of the workers being struck by muck trains.

### Tunnel Tracks

It is neither necessary nor always possible to have double tracks running through the tunnel. So the layout consists of a single track, with switches and sidings at convenient intervals. Because of the grades in the tunnel, derailing switches are installed in front of the bulkheads and heading. In the normal position they are open and must be closed by hand before a train can pass. Red electric lights on the sides of the tunnel warn of the location of these derailers.

Stationed at the derailer before the heading is a switchman who closes the ground throw switch on the approach of a train. At the other points the motorman brings the train to a stop and a helper closes the switch. Thus if a train should get out of control, it would leave the rails before it could crash into

*(Continued on next page)*

# Safety in Tunnel

(*Continued from preceding page*)

the bulkhead and air locks or into the tunnel heading.

Other safety features used on the grades are dogs which move on a pivot. They can be flipped over on top of the rail to act as a block and prevent cars from running away while being loaded or just standing by. When in transit, locomotive engineers sound a whistle or bell at regular intervals to warn of the train's approach.

### Drilling

All drilling in the tunnel is done with drifters using hollow drill steel through which water flows to reduce the dust. These water-liner drifters are in the Class III category of the New York State industrial code; they have low air and high water-flow characteristics. Wet drilling alone, however, is not considered sufficient precaution against silicosis, and the tunnel must be ventilated with 1,200 cfm of air for each drill in use.

When Mason & Hanger Co., Inc., was driving a 24 x 24-foot pilot tunnel through rock, an air-water spray was used to confine to the forward pocket of the heading smoke and gas fumes which resulted from the blasts. The spraying was done behind the opening of the ventilation pipe. And the noxious vapors were sucked out before they could filter past the screen of air and water cutting across the tunnel.

After this same contractor had completed the pilot tunnel, he began enlarging it to the full 31-foot-diameter section. Test borings were taken every few feet along the tunnel roof to make certain that an adequate rock cover of at least 10 feet was present. A close check on this work was kept by means of a scale model of the tunnel cross section set up in the contractor's field office.

The model is built to a scale of 2 feet equals 1 inch. It consists of two circular rims cut out of plyboard and representing the perimeter of the tunnel. The circular sections are set in a wooden base 5 inches apart, the equivalent of 10 feet on the ground, according to the scale. Mesh wire with ¼-inch square openings is secured to the wooden rims, with each side representing 6 inches.

Through these openings small circular pegs are passed to simulate the drills probing towards the tunnel roof, or making blast holes for the enlargement from the pilot tunnel. Numbers from 1 to 9 are marked on the ends of the pegs to indicate the delays that are to be used at each point. By first laying out the drill pattern on the model, the drillers can be shown exactly what they are to do in the tunnel itself. With the parallel circles of wire mesh, even the angle at which the drills are to be driven can be demonstrated with the wooden sticks. The model permits more definite control over the drilling, and results in more efficient work. It also contributes an additional safety factor, the natural concomitant of a well planned and well executed operation.

### Handling Explosives

Both contractors are using du Pont special 40 per cent dynamite, contained in 50-pound boxes with 100 sticks, 1¼ x 8-inch, to a box; the charges are exploded with du Pont electric blasting caps having 16-foot lead wires. Not more than 1,500 pounds of dynamite and 2,500 exploders are stored on either job at a time.

On both contracts the dynamite and exploder caps are kept in separate magazines. These are at least 100 feet apart and a minimum of 100 feet from the shafts. They are wooden boxes covered with metal plate and painted a vivid red, on which the word "Danger" is printed in large white letters. They are surrounded by a stockade with double walls, 8 feet high, varying in thickness from 2 to 5 feet. There is a 2-foot passage in between by which the magazines are reached. The narrow openings in the inner and outer walls are staggered so that they are not opposite each other.

Each wall consists of a double wooden form like that used in concrete construction, but the space between is filled with sand. The boards used are 1-inch stock backed with 2 x 4 studs on 2-foot centers, and tied together with double 2 x 4 wales on 3-foot centers. On the Manhattan side a light wooden roof covers the magazines, while on the Brooklyn side no roof is used. This sturdy construction is employed because of the proximity of the job site to surrounding buildings. It is designed to confine the direction of a possible accidental explosion upwards into the air, rather than sideways where damage might result.

(*Continued on next page*)

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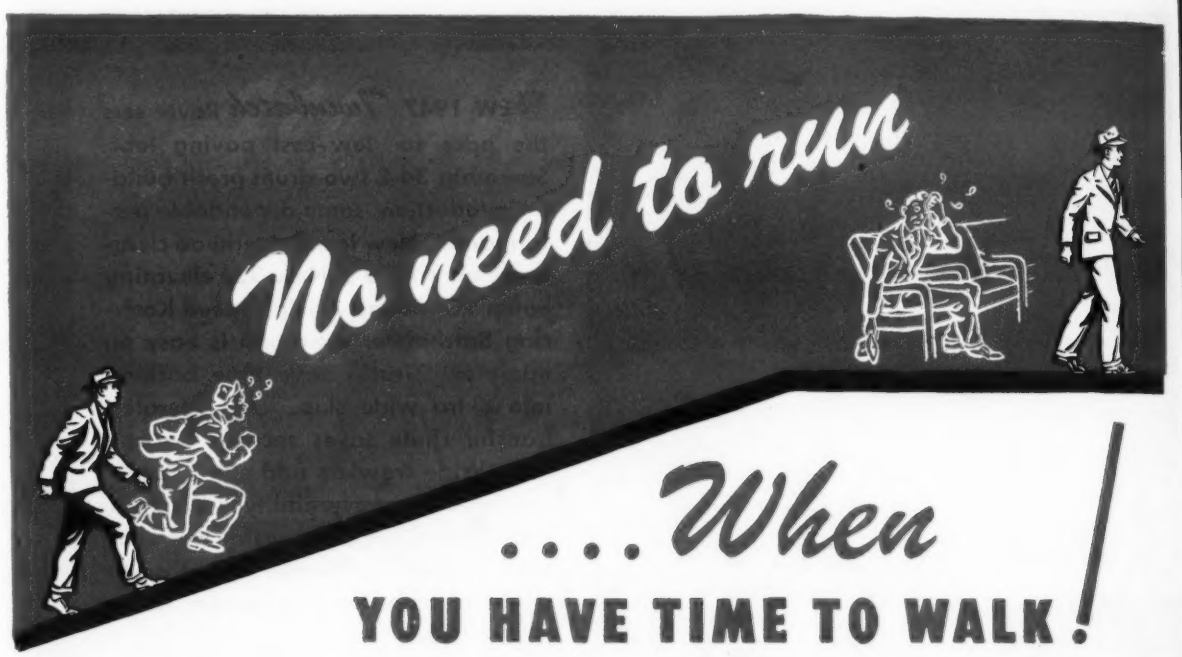


Running when you have time to walk is a waste of energy, especially if you must wait after you get there. Likewise, a portable compressor that always compresses air at its top speed, even though *a much slower speed would often be fast enough,* wastes fuel and causes unnecessary wear.

Ingersoll-Rand's K-Series MOBIL-AIR compressor knows enough to slow down and compress air at a slower speed whenever its full capacity is not required. Its Drill-More Multi-Speed Regulator *automatically adjusts the speed of the compressor to the use of air.* It eliminates wasteful idling... it maintains a lower and more efficient average compressing speed...it saves up to 30% in fuel on an average job. Wear and tear are reduced... MOBIL-AIR lasts longer.

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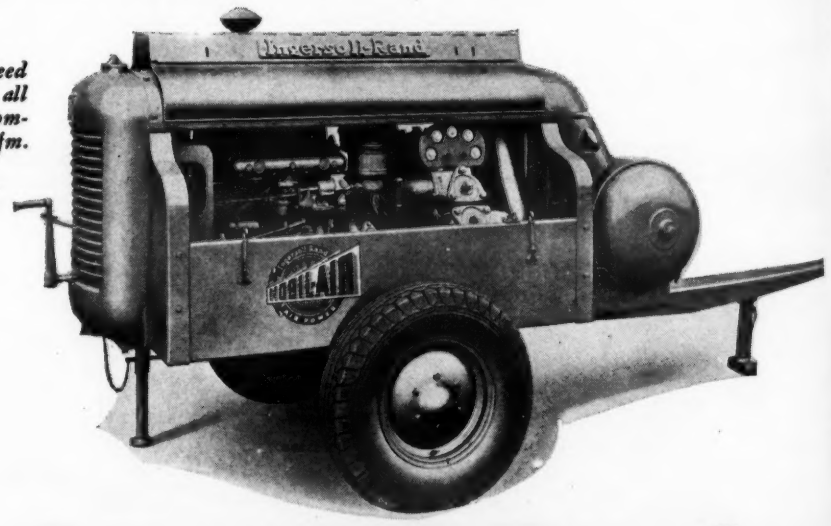
*The Drill-More Multi-Speed Regulator is standard on all K-Series MOBIL-AIR Compressors, sizes 105 to 500 cfm.*




Ingersoll-Rand

# Safety in Tunnel

(*Continued from preceding page*)

On the Brooklyn side the powder monkey carries the dynamite, not more than 100 sticks at a time, in a wooden box slung over his shoulder. No nails are used in the construction of the box in order to eliminate the possibility of striking a spark; the joints are dovetailed and fastened with wooden pegs. The caps are carried in a similar box by the blaster, and the two keep 25 feet apart on their way from the respective magazines to the tunnel heading. When passing through the air lock they sit at opposite ends, and the only other occupant of the chamber is the lock tender.

On the Manhattan side, Mason & Hanger uses a greater amount of dynamite because of the solid rock through which it is driving. It employs a powder car to transport the charge and caps to the heading. The wooden car operates on the narrow-gage track and is 7 feet 6 inches long, 3 feet 9 inches wide, and 3 feet high. It contains two compartments; the larger one occupies three-quarters of the car for the dynamite, and the smaller one is for the caps. Doors on opposite sides of the car open into each compartment. The compartments are separated by a double wooden wall and are lined with rubber mats to absorb shock.

The usual procedure is as follows: the powder monkey loads the dynamite into its compartment; this is then closed; and the car is lowered to the bottom of the shaft with no passengers permitted in the cage at the same time. The caps are brought down separately, placed in the other compartment, and the car is dispatched to the heading on a special train, also with passengers barred. At each end of the car is attached the word "Explosives" in luminous buttons.

Before the drill holes are charged, all electric lights are disconnected for 100 feet back from the heading. And illumination is provided by large floodlight lanterns, well insulated, which are set far back from the holes. Thus premature explosions by an electrical contact from faulty insulation are prevented.

When the lights are again turned on, but before mucking begins, loose rock in the tunnel roof is dislodged by drillers with scaling bars working from a high movable platform. Going carefully over the tunnel roof first lessens the danger of rock falling on the workers later. Deep fissures in the rock are also grouted to check seepage. The muck pile is kept wetted down by sprinkling with a water hose during excavation to reduce the dust content of the air.

### Ventilation

On the Mason & Hanger Co., Inc., contract from the Manhattan side, the bulk of the tunneling is done through rock with the use of free air. There ten drifters are at work, requiring 1,200 cfm of air for each drill. Two Ingersoll-Rand combination blower and exhaust fans supply 12,000 cfm of air to the two headings for the necessary ventilation. While the holes are being charged, and for about 15 minutes after the blast, the fan is used as an exhaust, sucking the smoke and fumes from the heading. Then the direction of flow is reversed, and fresh air is blown to the heading as the sand hogs resume operations.

The velocity of air flowing in the 24 or 30-inch ventilation pipes is checked at weekly intervals to make certain that the joints are still tight and have not been loosened by the blasting. An Alnor velometer which gives the velocity of air in feet per minute is used in the tests.

Also at weekly intervals and following a blast, the air in the tunnel is tested for carbon monoxide; 0.03 per cent for exposures of less than one hour is the maximum content under which the New York code permits work to be conducted. For exposures of two hours or more, 0.01 per cent is the maximum. Tests are taken on a Mine Safety Appliances carbon-monoxide indicator; it shows the percentage of the gas contained in an air sample taken by turning a crank on the machine. A hose can be run from the indicator to sample air at the heading or in a tunnel pocket. The air samples taken indicate a very minute proportion of carbon monoxide ranging from 0 to 0.004 per cent.

Weekly tests are also taken during drilling and mucking operations to check on the dust content of the air. With the use of water lines, less dust is usually raised during drilling than when mucking. Air samples are taken at the top, center, and bottom of the tunnel heading with a Mine Safety Appliances Midget Impinger apparatus. A crank is turned on the machine for 10 minutes during which time 1 cubic foot of air is drawn through the device. The dust particles pass through an alcohol solution and are collected in a test tube.

Later, in the engineers' field office, minute specimens of the dust-laden solution are observed under a high-powered microscope. And an actual count of the particles is taken with the aid of a cross-hatched guide plate on the slide, and a hand counter. By interpolation, the number of particles in a cubic foot of air is thus determined. The maximum permitted by law where men are working in rock containing 10 per cent or more of free silica is 10,000,000 particles per cubic foot of air.

### Communications

Communication on the Mason &

(*Concluded on next page, Col. 3*)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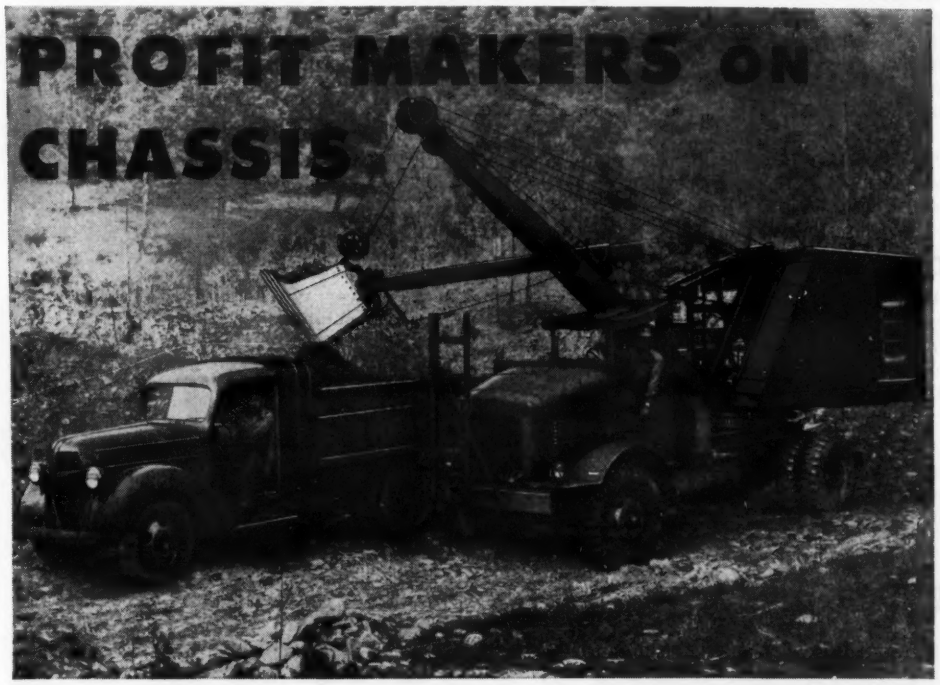
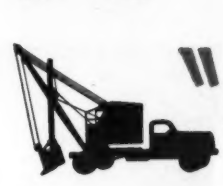
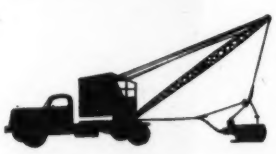
**SIX ONE**



**"QUICK-WAY"* TRUCK SHOVELS**



*REG. U.S. PATENT OFFICE

When you buy a ***"QUICK-WAY"*** you own six pieces of equipment on one chassis —any one of which can be ready to use in a matter of minutes...shovel, dragline, clamshell, trench-hoe, crane or pile driver.

Regardless of what larger equipment you have, you need ***"QUICK-WAYS"*** too. On many jobs heavy and slow moving equipment is either too slow or can't be moved without waiting for a trailer. This costs money. A ***"QUICK-WAY"*** does these jobs quickly—at a profit. Between jobs you can travel at truck speed —on or off the road.

Rugged simplicity, interchangeability of parts, properly balanced design for truck mounting, easy adjustment and repair, low maintenance—these are additional advantages that cut costs and leave a bigger profit on man-hours and investment. Ask a ***"QUICK-WAY"*** owner; there's one near you.

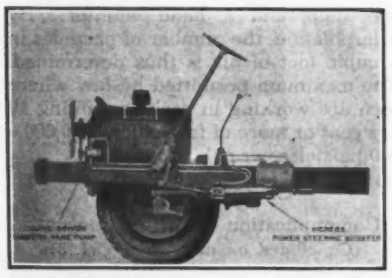
*Model E: 4/10 cu. yd. cap., for mounting on any standard 5-ton truck.*
*Model J: ¼ cu. yd. cap., for mounting on any standard 1½-ton truck.*

**Service available from our Distributors, strategically located throughout U. S. and worldwide.**

**For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.**

**"QUICK-WAY" TRUCK SHOVEL CO.**
**DENVER, COLORADO**

**First to build power shovels for truck mounting; still the leader after 28 years**



The Vickers hydraulic power-steering system can be used on road-building, maintenance, and construction equipment, as well as on trucks. The redesigned model is said to give positive steering regardless of obstructions.

## Truck-Steering Aid

Full production of its redesigned hydraulic power-steering system is under way at the factory of Vickers Inc., 1492 Oakman Blvd., Detroit 32, Mich. Features claimed for this model are simplified installation, cost reduction, 13 per cent lighter weight, and rugged and compact construction.

The Vickers hydraulic system is adaptable to use on road-building, maintenance, and construction equipment, as well as on trucks. It is said to give positive shockless steering regardless of road obstructions, blowouts, ruts, sand, gravel, or other road and off-the-road hazards.

Further information may be secured from the manufacturer. Or use the enclosed Request Card. Circle No. 81.

## Dry Chemical Fights Fire

A fire extinguisher which employs dry chemical in powder form is described in Catalog D-4620 of the Ansul Chemical Co., Fire Extinguisher Division, Marinette, Wis. The dry chemical expelled by gas pressure releases 1,100 times its volume in non-toxic fire-smothering gases when it strikes the flames.

Models illustrated in the catalog range from those of 20-pound capacity to the large wheeled types with a capacity of 300 pounds. Special units include truck mounts and a mine car.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 60.

## Rubber Goods

A line of rubber goods for the construction industry is made by the Quaker Rubber Corp., 4641 Comly St., Philadelphia 24, Pa. These products include conveyor and transmission belts; hose for air, gasoline, pneumatic tools, steam, suction, water, and welding; couplings, clamps and nipples, gaskets, pump valves, pump diaphragms, etc.

Items in the line are made in many sizes and styles to fit most construction needs. They are made in several plies as well as with special coatings to suit individual jobs.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

## FWD Dealers in West

Two new dealer appointments have been made by The Four Wheel Drive Auto Co. of Clintonville, Wis. The state of Wyoming will be covered by the Studer Tractor & Equipment Co., of Casper. The M. B. Salisbury Co., Inc., of Topeka, will cover the portion of Kansas east of and including the Counties of Republic, Cloud, Clay, Geary, Lyon, Coffey, Allen, Neosho, and Labette.

## Safety in Tunnel

*(Continued from preceding page)*

Hanger contract is maintained over the regular telephone circuit which extends down the shaft and into the tunnel right up to the heading. Thus anyone in the company's headquarters at 24 State Street in downtown Manhattan can talk to the field office on the job site, the change house, the first-aid station, the various shops, or to the superintendent at the heading.

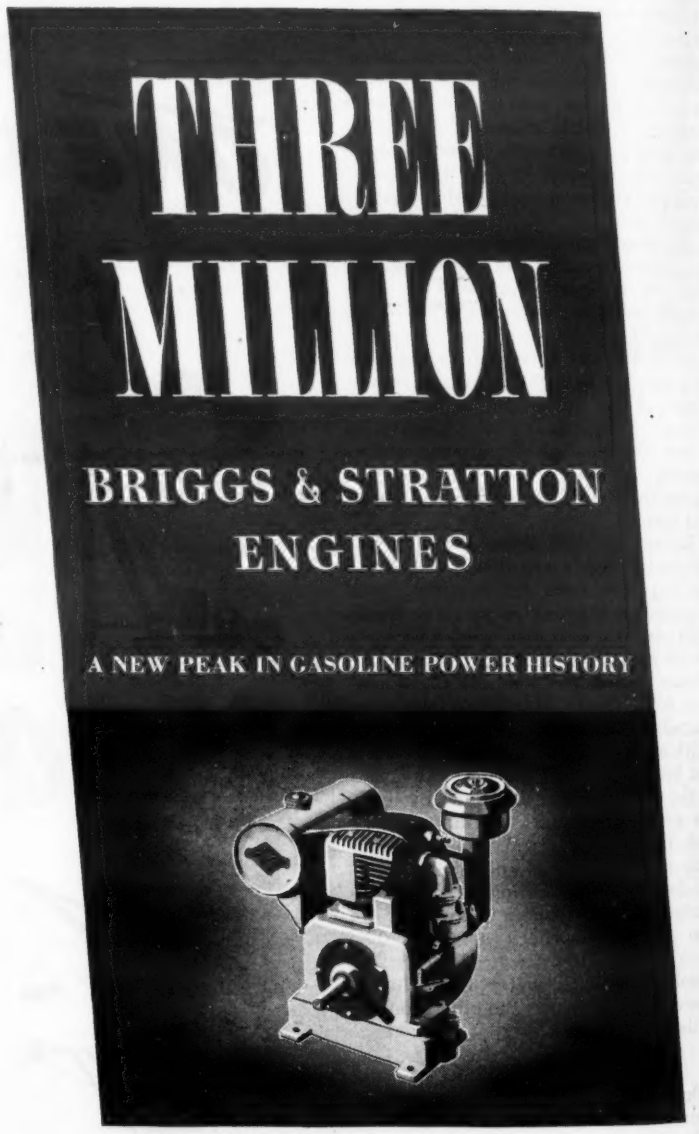
In addition, an emergency telephone line is strung down the shaft and up to the heading. This is operated by batteries, and the call bells are hooked to a magneto and rung by turning a crank. Thus if anything should happen to the regular line, telephone communication in the tunnel could still be carried on.

Last but not least of the various safety measures taken on the Brooklyn-Battery Tunnel job is the posting of signs and notices in the contractors' offices, change houses, timekeepers' quarters, and around the job. These advise the personnel to be careful; to guard against fire; to report accidents immediately; and to wear the proper clothing, including hard hats at all times as a safeguard against falling objects. Various other notices are a constant reminder to the men to exercise care and common sense in the interest of safety.

## Mobile Swing-Crane Data

A bulletin describing its mobile swing-boom crane is available free upon request to the Silent Hoist & Crane Co., 841 63rd St., Brooklyn 20, N. Y. Bulletin 69 tells the story of the KraneKar in detail. It carries several pictures of the unit in use; it lists its features; and it includes a table of specifications for the four models made. Mounted on either solid or pneumatic tires, the KraneKar is available in 1¼, 2½, 5, and 10-ton capacities.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 53.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ENGINES
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GASOLINE ENGINES
POWER

# Compaction of Soils Is Conference Subject

**ARBA-Sponsored Two-Day Session At Buffalo Covers Practical Methods And Equipment for Soil Compaction: Vibration Is New Development**

✦ SOIL compaction and the equipment with which to secure it in embankments, fills, and subgrades were discussed at a recent conference in Buffalo, N. Y. The two-day meeting was sponsored by the American Road Builders' Association Committee on Compaction of Soils, and the Soils Section of the Joint Committee on Development of Highway Construction Equipment of the Highway Research Board and the ARBA. It was attended by 86 highway engineers, contractors, and equipment manufacturers.

Most interesting of the various subjects discussed were the experiments under way to develop a vibratory unit for the compaction of soils, both for backfill in restricted areas, such as bridge abutments, and for fills, subgrades, and bases. Prof. Gregory P. Tschebotarioff of Princeton University reported on studies being made of the effect of vibration on soil densities. These have indicated that granular materials, uniformly graded, are particularly susceptible to vibratory rather than static force. He warned, however, that the vibratory force is easily dissipated. To be effective, the vibrations must be transmitted to the material directly and not through any shock-absorbing equipment. His studies have also indicated that best results are achieved when the vibration is accompanied by weight.

Various equipment manufacturers told of experimental vibratory units now being developed or tested. These include vibratory rollers, special units for backfill, and vibrators to operate on the subgrade somewhat as the concrete vibratory screed does. At the present time, most of these units are in the development or test stage and it is still too early to report on results.

### Compaction Is Basic Problem

The two sessions of the first day were presided over by Earl F. Bennett, Principal Soils Engineer, New York State Department of Public Works, and Chairman of the ARBA Committee on Compaction of Soils. They began with a word of greeting by Harold F. Clemmer, Engineer of Materials and Tests, District of Columbia; a summary of the work of the various ARBA technical committees, of which Mr. Clemmer is general chairman; and a statement of the purpose of such regional conferences. Then Mr. Bennett invited discussion of the various problems of soil compaction.

The purpose of compaction, Mr. Bennett said, is to obtain soil which can be used as a structural material to support a load. It is a waste of money to build a subgrade more than once. It is therefore essential to highway economy that the roads now under construction have subgrades and bases adequate for the loads they will carry. The job of the soils engineer is to aid the design and construction engineers in that task.

For practical purposes, Mr. Bennett broke down the various types of soils into four classes: (1) granular free-draining soils; (2) quaky soils, such as fine sand and silts, in which the amount of moisture is critical; (3) plastic soils, such as clay and clayey silts which lose strength on remolding; and (4) expansive soils, in which moisture causes expansion with a resultant loss of compaction.

The real problem confronting engineers and contractors is not the theory of soil compaction but the use of compaction: how to control density in the field and at the same time keep equipment moving on the job. Some of the job factors are the types of soil being handled, how they are being spread, moisture control, and the amount and kind of rolling.

### Layers—How Thick?

How important to compaction is the depth of fill layers? Mr. Bennett felt it was one of the first points to be observed in securing proper compaction. And considerable time was devoted to an exchange of opinions and experiences in this matter.

In general, state specifications call for 6 to 8-inch layers for the shallower earth fills—with a decrease in layer depth for deep fills and if pavement is to be placed the same season.

It was pointed out that the placing of rock fill has been passed over in many specifications. It is important, particularly from the contractor's point of view, to be practical in drawing the line at which end-dumping is not permitted and placing of layers is required. A number of engineers from New York, Pennsylvania, Ohio, and the Province of Ontario reported on experiences with rock fills.

In some cases, in deep rock fills, the rock is end-dumped to obtain a working area and then placed in layers. Where large rock is used, the distribution of small rock and spalls to fill the voids is desirable. As the top of the fill is reached, it is important to secure an ample top dressing which will prevent loss of subgrade in the voids. Care in the selection of material for dressing is also important.

It was the consensus that soft or rotten rock causes considerably more trouble than hard rock. When using the former, it is important to place it in as thin layers as possible and break it up as much as possible under rollers.

The agreed-upon minimum thickness of layers for hard rock was 2 feet; for soft rock it was 8 inches, loose, although in New Jersey 6 inches is the minimum for shales. The maximum for hard rock was set at 5 feet, although some states set it at 3 feet.

For fine materials, 6 to 8-inch layers

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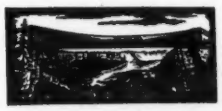

EVEN IN THIS ATOMIC ERA, what engineer wouldn't be awed at the possibility of building a bridge of his own design across the hazardous Niagara gorge? Yet John A. Roebling was commissioned to do just that *98 years ago* . . . ten years before this country's first oil well was drilled!

What an outstanding example of confidence. The confidence of a man in his own work. The confidence of people in one man and his abilities . . .

Today this same confidence, that has been nurtured through the years, is still alive in the company founded by this man and his sons. On this same foundation was built a business that has always believed that confidence must be created and grows through completely honest business transactions with each and every one of its customers.

Little wonder, then, that your confidence in John A. Roebling's Sons Company is guarded so carefully.

**Why Contractors Specify "Blue Center" Steel Wire Rope**

BASICALLY, there is but *one* reason: a firm confidence in the Roebling name and reputation, in the Roebling organization and representatives, in the quality of the wire rope itself.

Of course, there are other reasons, too. You have the assurance that the complete range of constructions and sizes in "Blue Center" Steel Wire Rope includes the *right* rope for your installation. And whether it's a preformed or non-preformed type, you can trust it to give you most service for the money.

Let a Roebling Field Engineer advise you on unusual problems of rope selection, operation and maintenance. His knowledge is based on his own experience *plus* field studies, research and thousands of service records studied by Roebling's Engineering Department. Call him at our nearest branch office.

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**ROEBLING**

*A CENTURY OF CONFIDENCE*

# Compaction of Soils Is Conference Subject

(*Continued from preceding page*)

are required, reduced to 4 inches in some cases. In sticky clays, it has been found that contractors have had to reduce the thickness to as little as 2 inches, to keep their equipment from bogging down.

One of the practical considerations in the problem of placing fill in layers is the contractors' attitude towards this requirement. It was reported by engineers from a number of states that contractors have objected to this specification before working under it; but after experience with it, they find it an aid rather than a hindrance. In fact, in some cases they have reduced the depth of layer of their own volition to keep equipment moving. In others they have found that thin layers reduce the cost of securing the required compaction and, where the material exceeds optimum moisture, they provide better aeration. One state highway engineer reported that contractors particularly welcomed compaction requirements on jobs where they handled both grading and paving.

### Moisture Control

The weather, which no one can govern, is the big factor in control of moisture. In some cases and in some regions, dry soils and the addition of water constitute the problem in moisture control. But the more frequent problem in the states represented at this conference is that of drying too-wet soils.

As for dealing with dry soils, it was pointed out that water can be added to obtain the required moisture content. And it was agreed that thin layers and more compactive effort are essential. The use of calcium chloride to retain moisture in fast-drying soil was discussed. It was pointed out that it often helps achieve required density with less compactive effort.

Wet soils pose this problem: they limit the weight of the equipment used on them. In the solution of this problem, there are several factors: (1), the weather, about which the contractor can either cuss or pray; (2) aeration, aided by the use of thin layers of material, and frequently achieved by equipment such as disks, or some type of mechanical mixer which tosses the material into the air, breaking up clods, and exposes it to the effect of evaporation; (3) leaving the spread material for a period of time to dry out.

Moisture content of the air must also be taken into consideration: the fact that it is more difficult to dry soils early in the morning and late in the day than during mid-day. This is a vital factor where job speed is essential.

There was considerable discussion on the degree of control of moisture content. Moisture control is a fairly recent requirement, and state specifications range from on the dry side, to close to optimum, to considerable leeway. Some states make no requirements as to moisture content or degree of compaction, specifying rather the type of roller and number of passes.

This question of number of passes vs. degree of compaction as a requirement was thrashed out, with divergent opinions expressed. It was pointed out that both method and result cannot be specified. The highway department can either specify the method and accept the result, or it must specify the result and leave it to the knowledge and experience of the contractor to achieve the required compaction.

One contractor present stated that his firm prefers to have the end result specified. But he warned that under those circumstances inexperienced contractors may underbid experienced ones because they don't realize what is involved.

Perhaps the best solution is to specify the results desired, and outline, as a guide to the contractor, a method and equipment which may be used.

### Field Checks on Density

Throughout this conference, emphasis was placed on the practical side of soil-compaction problems. So—in the matter of density checks—it was agreed that a contractor should not be held up because one sample fails to meet required density. When several checks show failure to meet the specifications, it was suggested that the next step is to talk things over with the contractor and, working with him, to analyze the trouble and correct it.

In general, those states which have density requirements check compacted fill about every 3 hours—not necessarily every layer—and add to this the observation of the resident engineer. Control of density in the field is a combination of knowledge, experience, good judgement, and observation, with enough tests to record average conditions.

### Other Soil Problems

Among the other subjects brought up was the foundation for embankments. Slides and shear failures are due to an insufficient investigation of the terrain prior to placing fill. A study of soils is necessary before designing a project. For it is as important to know what kind of material you will be working *on* as it is to know what kind of materials you will be working *with*. Slide prevention is a matter of soil mechanics.

Subsidence at bridge abutments was also discussed, and many cases reported of settlement of fill adjacent to bridge structures. Adequate backfill tamping was urged as one solution; a limitation on the rate of construction of such fills was suggested as another. Again, it was pointed out, a knowledge of the foundation on which the fill is placed can aid in correcting conditions which lead to such settlement.

Benching on slopes also came in for discussion. New York State now specifies benching in some cases when fills are being placed against 3 to 1 slopes or steeper. Pennsylvania uses benching but only on steeper slopes, and in other

(*Concluded on next page, Col. 4*)


Cost-Cutters

INTERNATIONAL

**Efficient Dirt Moving Hems in Old Man River**

THREE International TD-18 Diesel Crawlers moved 150,000 cubic yards of black gumbo, sand and clay, in 60 calendar days. They were rebuilding a levee near West Memphis, Arkansas, on the Mississippi. Hauls were as long as 1200 feet, weekly yardage as high as 30,000. And they loaded at small borrow pits *without pusher assistance* to get capacity loads in 10-yard scoops. Only one additional crawler, a TD-14 with "Trail-builder," was needed to level the haul roads, dress levee to grade and spread dirt deposited by the TD-18's and their scoops.

Performance like this points up the superiority of International Diesels for earth-moving. Their 4-cycle valve-in-head engines provide dependable, economical power. Perfect weight distribution, adequate ground contact, rugged construction and extremely durable moving parts give them the ability to handle the tough earth-moving jobs with ease.

Their in-built, quick-starting system means that they waste no time getting to work. And the little time required for

CRAWLER TRACTORS
POWER UNITS
DIESEL ENGINES
WHEEL TRACTORS

INTERNATIONAL

## Buried-Factory Plan Studied by the U.S.E.D.

The feasibility and cost of building and running underground plants and storage sites is being investigated by the Corps of Engineers, U. S. Army. A contract for this study has been let to the engineering firm of Guy B. Panero, New York City.

Mr. Panero and his staff recently prepared a report on the underground construction for German industry. It was based on an on-the-site investigation made for the Army right after hostilities of World War II ceased. The purpose of the current study will be to gather information on how to protect essential war plants against aerial raids.

Two types of underground sites will be considered. The first are existing mines. The second are underground chambers purposely excavated to suit the requirements of the plant or storage facilities involved. Natural caves are considered unsatisfactory because they are, in general, relatively small and irregular in character; too, they are usually at a considerable distance from suitable transportation.

To be considered, a mine has to have more than 30,000 square feet of usable floor space, a roof not less than 8 feet high, and a reasonably level floor. Although exact figures are a military secret, it has been disclosed that several hundred million square feet of usable underground sites in existing mines are available.

The study will include an above-ground and underground comparison of cost, construction, and operation of a chemical-processing plant which involves large tanks and appurtenances, the generation of large amounts of heat and noxious gases, and certain explosive hazards. The same line of investigation will be followed in regard to precision-manufacturing plants which require exact temperature and humidity control. The physiological effect on workers will also be studied. Information on present-day aboveground plants of these types has been made available by the Chemical Corps and the Ordnance Department of the U. S. Army.

The studies are part of a long-range program and are being developed under the policy direction of the Army-Navy Munitions Board.


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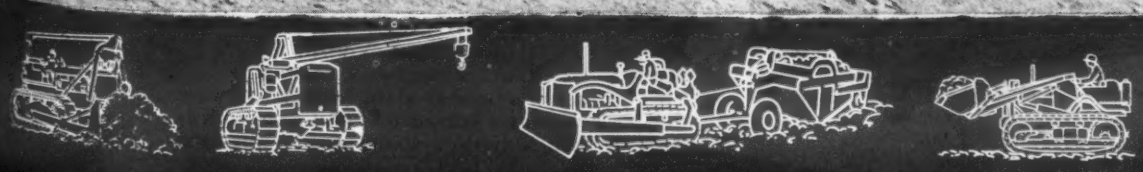



## Compaction of Soils Is Conference Subject

(*Continued from preceding page*)

cases relies on the bulldozers' cutting into the slope to tie in the fill. Ohio also believes the use of a bulldozer is sufficient.

### Base-Course Construction

The thickness of granular base courses varies, in the different states represented, from 8 to 24 inches. In some states where there is plenty of gravel, 36-inch base courses are not unusual. Other states, such as New York, must conserve gravel; frequently, therefore, they use a bottom layer of sand on 24-inch base courses.

Subgrade drainage always brings forth a divergence of opinion. Shall we have drains too, in addition to free-draining granular bases, and if so, where? At the side, down the middle, and weeps at 50 to 100-foot intervals were suggested.

### Equipment for Compaction

The subject for the second day was the development of equipment for compaction of soils. Prof. Kenneth B. Woods of Purdue University, Chairman of the Soils Section of the Joint Committee on Development of Highway Construction Equipment, was scheduled to serve as Chairman of the session. Since he was unable to attend, Mr. Bennett again presided.

In addition to the experimental work on vibratory equipment already covered, various other equipment for earth-moving, manipulation of soils preparatory to compaction, and rolling were discussed. As these are all standard units now used in the field, the discussion was devoted mainly to where the various kinds available are best adapted. For example, it was brought out that a sheepsfoot roller is not the best choice for compacting granular materials, but is most suitable for the plastic soils. The rubber-tire rollers are most suitable for light sandy soils. Other work calls for the smooth rollers.

The compactive effect of the modern heavy equipment used on most grading jobs was also discussed. In some cases, it is apparent that such equipment aids compaction; in others it tends to damage the work already done. It was agreed that it probably is an aid in granular material, but that it causes rutting in plastic soils. The only solution when working in the latter material, seems to be to confine the equipment to a haul road and keep it off finished fill as much as possible.

Although the modern trend is towards heavy equipment of large capacity, it was pointed out that there are still many small and medium-size jobs which are not designed for it, and where its use leads to trouble. Some contractors recognize this and if they own only heavy equipment they don't bid on the job.

Adjusting equipment to the size and type of the job is, in general, the contractor's problem, and calls for knowledge and experience.

### Trend in Highway Work

There is no doubt that the present general trend in highway engineering is to give as much thought to the construction of the subgrade and base of a highway as has for some time gone into the design and construction of the pavement. The subgrade materials, how they are handled and with what equipment, and the load-bearing support they can be made to provide are basic factors in good highway construction.

Highway engineers and contractors are giving serious study to these problems, and a steady advance is being made in the knowledge and use of soils.

## Directional Vibration Marks Gasoline Tamper

A new reciprocating vibratory action, said to be exclusive with its gasoline tampers, is described in a bulletin issued by the Master Vibrator Co., P. O. Box 657, Dayton 1, Ohio. Free for the asking, Catalog No. 699-A-Rev. states that this action gives a new directional vibratory motion and produces a firmer and more uniform compaction. Effective for a 5-foot or more radius, it is said to result in deep penetration and compaction of the material being tamped.

Extra accessories for the machine include a clay and shale spading blade and an asphalt cutter. The bulletin includes a table showing the approximate weights and shipping dimensions for domestic crated or commercial export boxing.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 79.

## Moles Elect Officers

Charles B. Spencer is the new President of The Moles, New York society of tunnel and heavy-construction men. He is Vice President of Spencer, White & Prentis, Inc. Mr. Spencer succeeds Alfred N. Warwick, President of Eugene F. Warwick, Inc. Mr. Warwick was installed as a trustee.

Other officers of The Moles elected at the annual meeting were: J. Rich Steers, Jr., of J. Rich Steers, Inc., First Vice President; Carlton S. Proctor of Moran, Proctor, Freeman & Mueser, Second Vice President; Edward J. Mahoney of Mahoney-Clarke Co., Sergeant-at-Arms; William W. Hanly, Jr., of The Hanly Co., Secretary; and Ralph W. Atwater of Shultz Dredging Co., Treasurer.

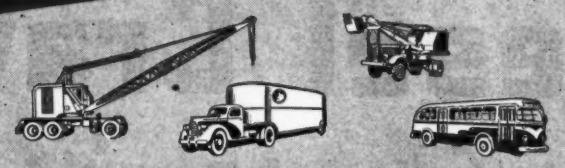
Trustees chosen in addition to Mr. Warwick include David Bonner, Frederick Snare Co.; William A. Durkin, Walsh Construction Co.; Thomas A. Scott, Merritt-Chapman & Scott Corp.; and Bertram L. Swett, Lehigh Portland Cement Co.

## Steel Firm Changes Staff

Several changes in its Sales Division have been made by The American Rolling Mill Co., Middletown, Ohio. Henry L. Woods, Jr., has been advanced to the position of Assistant to the Executive Vice President; Wallace B. Quail has been named Manager of the Central Sales area; and Robert Y. Barham has been advanced to District Manager of the New York-Boston District.


9 GOOD REASONS

for using VICKERS Hydraulic POWER STEERING



**1 FINGER-TIP STEERING** Finger pressure steers the heaviest vehicle equipped with Vickers Hydraulic Steering. Short, quick, effortless turns ease the job of parking, backing, loading and maneuvering in city traffic. On the open road there is no lag or road wander.

**2 HEAVIER FRONT WHEEL LOADING** Many steering difficulties resulting from heavy front wheel loading are overcome by Vickers Hydraulic Power Steering. It provides light, easy steering with heaviest front wheel loading.

**3 LOWER STEERING RATIOS** Present high steering ratios can be lowered substantially with Vickers Hydraulic Power Steering.

**4 LESS DRIVER FATIGUE** The Vickers Hydraulic Power Steering Unit takes all the steering strain —the driver has none. Anxiety about unsafe tires and hazardous road conditions is relieved.

**5 LIGHTER CONSTRUCTION** An over-all weight reduction can be made in the construction of steering gears, housings and columns since all stress and shock are borne by the booster unit and vehicle frame.

**6 GREATER SAFETY** Blowouts, soft shoulders, ruts, cross winds, road obstructions or sudden stops—none affect steering. In event of engine failure or damage to the hydraulic system, steering automatically reverts to direct mechanical action.

**7 SHOCKLESS** On the road or off the road, the driver feels no road shock or wheel fight.

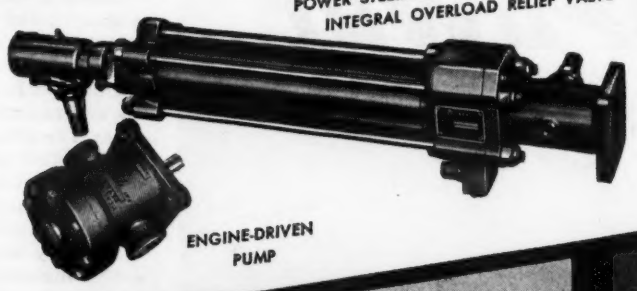
**8 LOWER COST** Simplified installation and lowered manufacturing costs due to increased production make the price per unit lower now than ever before.

**9 ADAPTABLE** Only minor alterations needed to apply Vickers Hydraulic Power Steering to new or existing vehicle designs.

Vickers Hydraulic Power Steering has been in successful use for more than 16 years. The redesigned unit with integral relief valve has had more than a year of testing on heavy buses and trucks under most severe operating conditions.

*Write for Bulletin 47-30 for full information.*

3170

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC
EQUIPMENT SINCE 1921

This is the Model 100 Badger trench excavator. The power take-off on the tractor furnishes the power. With the tractor in neutral, the trencher pushes it and digs at the same time. The machine can also be equipped with half tracks.

## New Trench Digger On Wheels or Tracks

A trench digger in three models is produced by the Badger Machine Co., 570-580 E. Front St., Winona, Minn. The Model 100 is tractor-propelled; the 102B is a half-track model; and the Model 103 is mounted on full tracks.

The boom is of the ladder type, has a standard digging depth of 6½ feet and a width of 24 inches, and is 17 feet long. The power boom hoist is mechanically operated, with hand operation optional. Road speed with full tracks is 8 mph; with half tracks, 10 mph; and with dual wheels, 15 mph.

The power unit is a Minneapolis-Moline 26-hp gasoline engine, with these units optional: Continental Red Seal, Wisconsin VF-4, or International Harvester. The digger has a rubberized 3-ply endless Dickbelt cross conveyor which runs in either direction. Standard equipment includes General Motors transmission and rear axle, and roller-chain drives.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

## AC, DC Welding Rods

A new electrode for welding low-alloy cast steel or low-alloy high-tensile-strength rolled steels has been announced by the Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. The new ACP-MO electrode can be used with ac, or with dc reverse polarity.

Best results are obtained when it is used for vertical or overhead welding, although the manufacturer says that satisfactory results are obtained in making horizontal fillet or flat-position welds. Welds are said to meet AWS-ASTM tentative specifications for iron and steel arc-welding electrodes, classification E-7011. The rods are available in four diameters from 3/32 to 3/16-inch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 36.

## Allis-Chalmers Personnel

William A. Roberts has been appointed Executive Vice President of the Tractor Division of the Allis-Chalmers Mfg. Co. of Milwaukee. William C. Johnson has been named to a similar position in the General Machinery Division.

Marshal L. Noel has been appointed Vice President and General Sales Manager for the Tractor Division, and J. L. Singleton has been named Vice President and Director of Sales for the General Machinery Division.

E. J. Mercer has taken over his new position as Industrial District Manager of the New York State territory for the Tractor Division, Allis-Chalmers Mfg. Co. Mr. Mercer formerly was Assistant Industrial Sales Manager for the company's Memphis, Tenn., branch office.

## Electric Chain Saw

A one-man high-cycle electric chain saw is announced by the Homelite Corp., 71 Riverdale Ave., Port Chester, N. Y. It weighs 27 pounds and can be used for felling, limbing, or bucking trees, or for cutting timbers up to 20 inches. It may be used for cuts at any angle.

The motor driving the saw is a 2½-hp 180-cycle three-phase unit with a grounded connection. There are no brushes to replace, no commutator to clean. Sealed ball bearings support the motor shaft and sprocket shaft. Pressure lubrication is provided for all moving parts, including gears and saw chain. If two-man operation is desired, a helper handle can be attached to the end of the saw opposite the motor.

The new Homelite electric chain saw weighs 27 pounds. It can be used for felling, limbing, or bucking trees, or cutting timbers up to 20 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 38.


KEWANEE BOILERS
for heating and power
since 1868
KEWANEE BOILER CORPORATION
Kewanee, Illinois

The HOLEWIZARD
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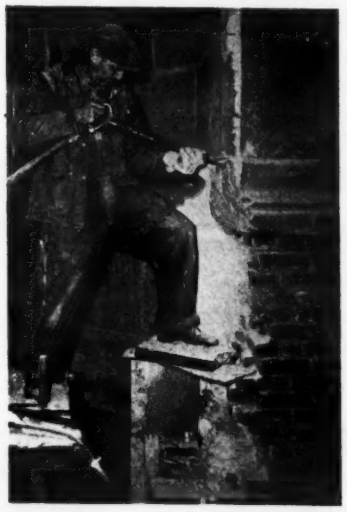
The Small One-Hand Rotating ROCK DRILL
DRILLS HOLES QUICKLY IN CONCRETE, BRICK, MORTAR, STONE
HITS and ROTATES at the SAME TIME

The HOLEWIZARD meets a long-felt need. Its one-handed operation leaves the other hand free. It hits and rotates at the same time—there is nothing else to handle or turn manually. Because it is sturdy, yet light and compact, this rock drill can be used almost anywhere. Makes quick work of many hitherto "impossible" jobs because of its great accessibility.



To use the HOLEWIZARD for CHIPPING, just remove the Ratchet, Part No. 20, as well as Nos. 11 Steel Holder, 24 Front Head, 27 and 28 Spring and Retainer. This is very easy to do. In this form the tool can be used for cutting concrete or brick joints, light riveting, driving nails, tree surgery and many other purposes. It is almost a universal tool with great flexibility and versatility.

SPECIFICATIONS MODEL No. 400
Capacity: ¼" to ¾" Drills. Weight: 8 lbs. Speed: 1800 - 2000 S. P. M.
Length: With Retainer 16" — Without Retainer 13"

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Manufactured by PNEUMATIC TOOL SALES & REPAIR CO., INC.
14-29 THIRTY-THIRD AVE., LONG ISLAND CITY 2, N. Y.

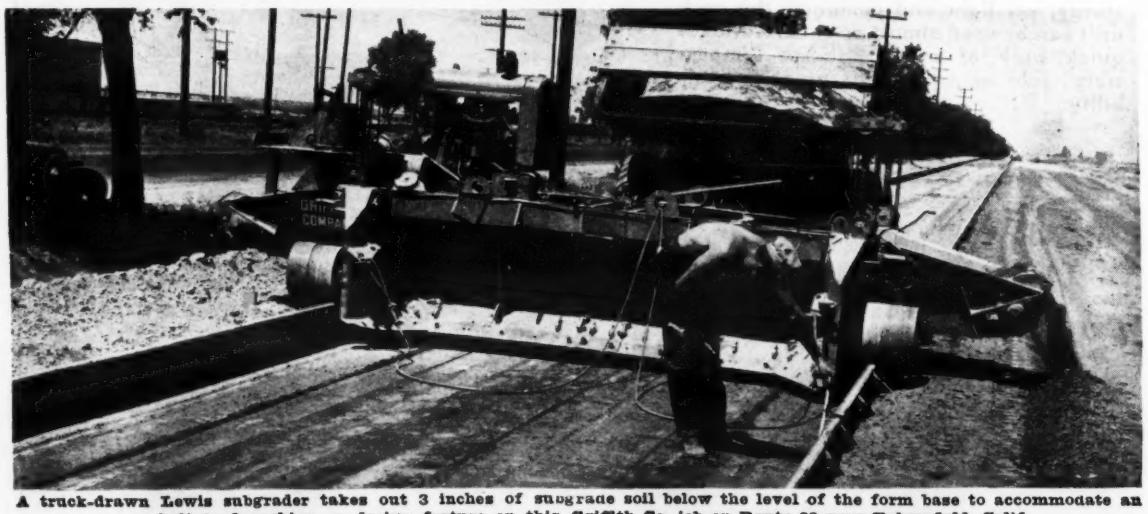
# *Brains and Brawn Build Two Concrete Lanes Fa*

## Highly Mech d J
## Traffic Capa of N
## Highway to F Lan
## Slab 23 Feet de fo

(*C. & E. M. Photos*)

### Form-Setting, Fine-Grading

Blaw-Knox road forms unloaded from a flat-bed truck are aligned to the string. A hefty workman merely starts the pins with a sledgehammer, for an Ingersoll-Rand pneumatic gun will slam them in at high speed.



A truck-drawn Lewis subgrader takes out 3 inches of subgrade soil below the level of the form base to accommodate an asphalt-sand cushion—a design feature on this Griffith Co. job on Route 99 near Bakersfield, Calif.

A Caterpillar No. 12 motor grader slashes in one pass through excess dirt discharged outside the forms by the rubber-belt conveyor on the subgrader. This dirt will carry the asphalt-spreading and concrete-mixing traffic.

### Seal Cushi oncr

A Buffalo-Springfield three-axle tandem roller compact cn asph box. The cushion is designed to prevent subgrad caused

Let 'er roll! Provision for a keyed longitudinal cont been slab. And now a Koehring Twinbatch 34-E paver d yard tamping m alon

# d
# s Fast

## echd Job Increases
## Capa of North-South
## to F Lanes by Adding
## Feet e for 6.7 Miles

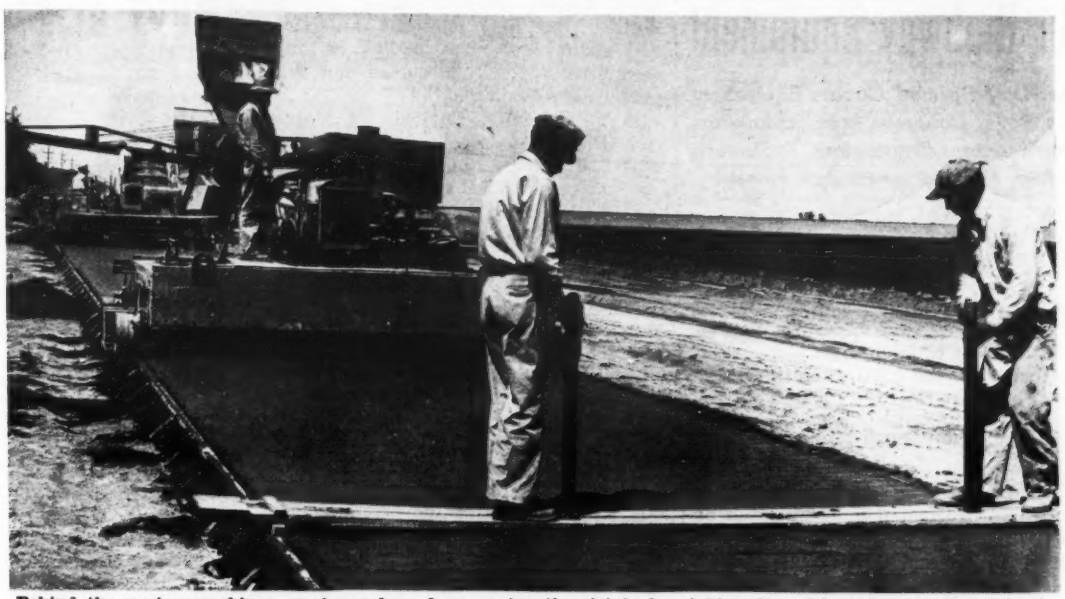
(*See article on page 6*)

## ashi ncrete Paving

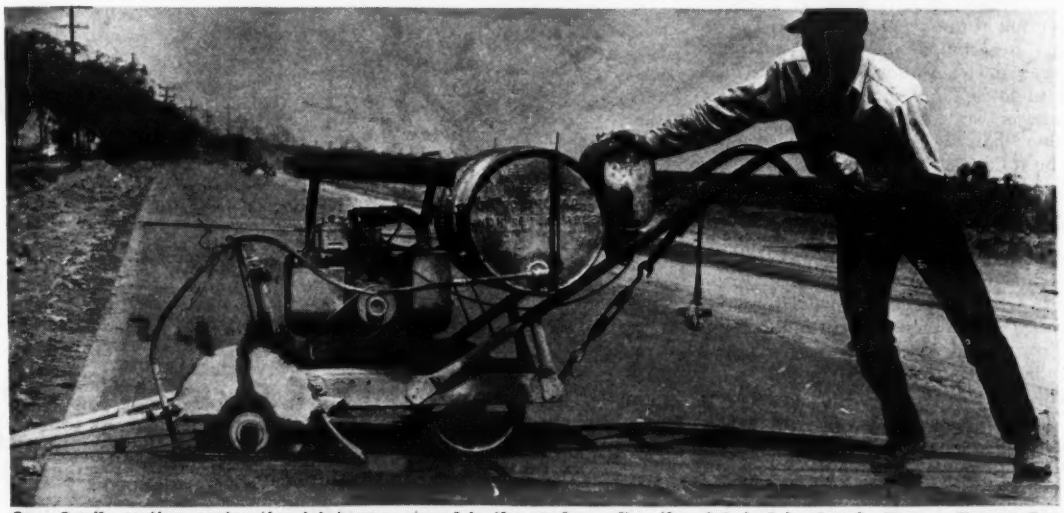
r compact on asphalt-sand cushion laid down by a Griffith-built spreader subgrade caused by surface water penetrating pavement cracks.

nal conta been made between the 12 and 11-foot lanes of the 23-foot paver d yard batch of concrete 8 inches thick. Jaeger spreading and ping ma closely in its wake.

## Contraction Joints, Form Removal



Behind the paving machines, workmen here form contraction joints by sinking ⅛ x 2-inch bars in the wet mix at 15-foot intervals. However, an experimental method of forming these joints was also used.



On a 2-mile section, contraction joints were sawed in the surface after the slab had hardened. Here a Concut Jr. mechanical concrete saw cuts a 2-inch groove. Clean-Cut Co. of Bell, Calif., subcontracted for this work.

One man fills dummy contraction-joint grooves with hot asphalt, as workers in the background remove any irregularities with a strike-off screed. A light-gray pigmented spray which reduces glare, developed specially for this job by Hunt Process Co., was used to form an impervious membrane over the concrete.

After pin pullers have done their work, a Shrader electromagnet mounted on a small truck crane picks up 10-foot steel form sections and loads them on a flat-bed truck. This was one of the fastest parts of a fast-moving job.

# ARBA Branch Confers On Highway Equipment

**Two-Day Session Covers Equipment For Soils, Concrete, and Bituminous Construction: Contractors, Engineers, And Manufacturers Are Present**

✦ A REGIONAL conference on equipment for soils, concrete, and bituminous construction was held June 5-6 in Boston by the New England branch of the American Road Builders' Association. It was sponsored by the Committee on Development of Highway Construction Equipment of the ARBA and the Highway Research Board.

### Soils Construction

The session on equipment for soils construction was presided over by Earl F. Bennett, Principal Soils Engineer of the New York State Department of Public Works. Discussion centered mainly around vibrators for the compaction of granular materials; several manufacturers described equipment of this type which they have, or soon will have, on the market.

As for compaction itself, the engineers and contractors present were unanimously in favor of having specifications state the results required rather than the method of compaction to be followed.

### Concrete Construction

The second-day session on equipment for concrete construction was headed by Charles W. Allen, Research Engineer, Ohio Department of Highways. Several of the men present favored going on record as recommending that a standard lane width be adopted for all highways.

There was considerable discussion on the use of concrete spreaders. The contractors present were definitely in favor of using this type of equipment. Some of the factors they named in its favor were: its use eases the leveling operation of the finisher, greater strength is obtained, in large jobs it tends to blend the dumped batches giving a greater density and more uniform results, it eliminates high spots, it provides an accurate strike-off for placing reinforcing steel, and it is easier to work concrete in this way than by hand.

The opinion was expressed that much of the new equipment is being brought out with increased size in mind, rather than actual improvements in design. It was felt that there should be a move towards equipment with more continuous operation. Many of the machines in use at the present time are as large as if not larger than necessary, and continuously operating rather than bigger machines are an urgent need.

Some thought was given to standardizing steel forms. One manufacturer present stated that the steel men would go along if such standards were adopted.

### Bituminous Construction

The session on equipment for bituminous construction got under way with the subject of what would constitute a modern bituminous plant. This was discussed in some detail. The consensus was that the trend towards a change from steam to gasoline, diesel, or electric power is a step in the right direction.

Three types of smooth-wheel rollers were discussed: the three-wheel, the two-wheel tandem, and the three-axle tandem. One feature advanced for the three-axle tandem is that its hinge arrangement does not allow the rear wheel to follow in the path of the forward wheel.

Kettles for heating rubberized asphalt and other bitumens were brought up. Most of the engineers and contractors who had used rubberized-asphalt joint fillers were pleased with the result. Some said they had achieved good results without using special kettles. But they felt that the extra care required was not justified as long as kettles specially designed for this purpose are available.

H. F. Clemmer, Engineer of Materials, District of Columbia, reviewed the object of the meeting, and told of the various committees sponsored by the ARBA. He urged all members to think about them, and if possible to become active in those for which they qualify.

The conference ended with a get-together of all present for cocktails and buffet supper.

## Euclid Dealer in Chicago

The Euclid-Chicago Co. has been appointed distributor for The Euclid Road Machinery Co. in northwestern Indiana, northern Illinois, and southern Wisconsin. Headquarters for the firm are located at 201 No. Wells St., Chicago 6, Ill.


**NOW Rolled from Alloy or Mild Steel**

Caine CORR-PLATE Steel Piling

Rolled from a new steel alloy, Caine Corr-Plate is now 25% stronger and has nearly 100% greater corrosion resistance. This alloy makes available equal strength and nearly double the life in a 25% lighter piling. Approved by Highway Departments and U. S. Engineers.

Caine Corr-Plate Steel Piling has been used the world over for Foundations, Dams, Retaining Walls, Docks, Levees, Bulkheads, Sewers, Disposal Plants and hundreds of other jobs—it's stronger, lighter, nestable, easy to drive and water tight; can be re-used again and again.

Doubled life and 25% greater strength make Caine Corr-Plate Steel Piling the bargain buy in piling!

***NOW, MORE THAN EVER BEFORE . . .***

**STRONGEST** PER POUND WEIGHT

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It's easy to make money...
with a
PITMASTER
Exceptionally low first cost combined with low maintenance and operating costs together with heavy production of more than 35 tons of minus ¾" material with 25% crushing mean profitable aggregate production in anybody's language.
10" x 16" roller bearing jaw crusher and 16" x 16" roller bearing roll crusher give you plenty of crushing output. Horizontal, double deck vibrating screen assures greater capacity, closer grading, and higher efficiency. Available with chip screen, hopper and feeder or swivel feed conveyor. Fast, easy set-up and take-down minimize lost time between jobs. When buying a crushing plant — buy the best — buy Cedarapids. If your requirements are moderate — buy a Pitmaster.
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The Iowa Line
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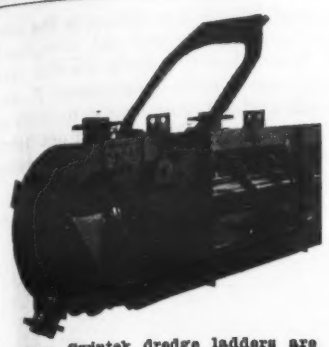


Eagle Swintek dredge ladders are available in both heavy-duty and light-duty types. This view shows the front end of the former.

## Dredge Ladders Do Heavy or Light Work

Dredging ladders in two types, heavy-duty for very severe digging service, and light-duty for light to average excavation, are included in the products of the Eagle Iron Works, 129 Holcomb Ave., Des Moines, Iowa. Both Eagle Swintek ladders are of the traveling-chain-cutter screened-nozzle type. They are made for standard pipe sizes from 6 to 16 inches, and for frame lengths ranging from 25 to 80 feet, on a scale of 5-foot length variation.

Chain travel speed is between 30 and 35 fpm. In operation hook-up, the drive mechanism transmits the torque of the prime mover, or power unit, to the chain driving sprocket. The former is usually of comparatively fast shaft rotation; the latter is of slow shaft rotation, varying from 5.0 to 7.3 rpm. Bearings for the shafts are of the radial, babbitted type. Power requirements vary from 10 to 50 hp, depending on the pipe size, the ladder duty construction and its length, and design details of the digging chain.

Side profile of the frame is rectangular. The front or nozzle end, supported by a bail, is a half-circle arcuate track; the diameter equals the principal depth of the frame. The rectangular-shaped rear end is of reduced depth. The offset is made on the under side of the frame, with a short length parallel to the top frame edge, then tapering to the rear end of the lower track which is about 10 feet from the sprocket center-line position.

The travel direction of the chain is from around the nozzle, with the pull up the top track, over the driving sprocket, and down the lower track to the nozzle. The top track extends the full length of the frame from the arcuate track to the sprocket; it is a wide, shallow U-section formed with two wide-flange angles lined with renewable wearing strips on both the tread and the side faces. The lower track is a rectangular box section constructed with wide-flange angles placed in the four corners.

The suction-pipe system furnished with each ladder includes: the nozzle, the frame pipe, and the offset pipe portion with its elbows up to the hose connection at the sprocket position. The nozzle mouth edge is a rectangular section carefully proportioned for opening size, in relation to the dredge pump capacity and the inflow-velocity of the water entering it.

The traveling digging chain is cast of Amsco austenitic manganese steel. Chain design employs the construction with rollers journalled on pins to minimize travel resistance on the ladder tracks. The screening openings, per chain construction, are fixed. They are of a size limiting free entrance only to solids which will not clog the pumping system.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 28.

*Accidents can be prevented.*
*Be safety-minded—it pays!*

## Trailer Line Ranges From 10 to 100 Tons

A line of heavy-equipment trailers ranging in capacity from 10 to 100 tons is made by the Beall Pipe & Tank Corp., 1945 No. Columbia Blvd., Portland 3, Oreg. These trailers are built in both semi and full-trailer models.

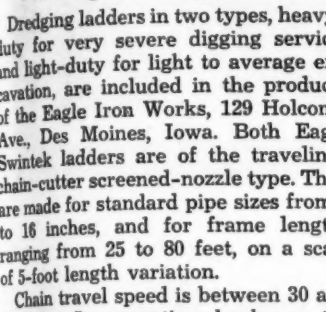
The Model B4WN is a 10 to 15-ton 4-wheel trailer with drop neck and a platform approximately 2 feet above the ground. The Model BDAM is a 20-ton dual-axle semi-trailer for hauling construction equipment. The Model B6WM is a 6-wheel trailer which is built in styles ranging from 20 to 100 tons. The largest semi-trailer which Beall makes is a 70-ton 3-axle model, also made in a 50-ton size.

Three styles of tandem axles are available: the BLTSS dual-axle unit, which has two ⅝ x 4-inch, 14-leaf springs; the Beall Calahan dual-axle rear assembly, a light 4-spring unit; and the solid walking-beam triple-axle assembly for the heavier models.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 6.

## Hazeltine Joins Galion

William J. Hazeltine has joined the staff of the Galion Iron Works & Mfg. Co., Galion, Ohio. He will serve as Special Representative of the Roller Division. Mr. Hazeltine was formerly Vice President and Sales Manager of the Buffalo-Springfield Roller Co.

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The Biggest Little Hoists in the world for use where power is not practical, available, or sufficient.

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| 2-Ton "Lightweight" | 75 ft. | ¼" |
| 5-Ton "General Utility" | 250 ft. | ⅜" |
| 15-Ton Triple-Geared "Special" | 1200 ft. | ½" |

With patent gear change and positive internal brake that never fails, and will lock load.

| Gear Ratios | Weight | Price |
|---|---|---|
| 2-Ton 4 & 22 to 1 | 60 lb. | $ 70 |
| 5-Ton 4 & 24 to 1 | 110 lb. | 90 |
| 15-Ton 4, 19 & 109 to 1 | 680 lb. | 350 |

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SPREADER AND VIBRATOR ONE OPERATOR
FINISHING MACHINE ONE OPERATOR
BULK CEMENT PLANT ONE OPERATOR
PORTABLE AGGREGATE BATCHING PLANT ONE OPERATOR
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MAXIMUM PERFORMANCE with MINIMUM CREWS

For road and airport paving and for general concrete construction, Blaw-Knox builds machines and equipment requiring only minimum crews to complete a quality construction project in the quickest possible time. *Low cost per yard* tells the story of the contractor's profit.

Look to Blaw-Knox for detailed information and performance data on the time and money saving equipment shown here — and also ask for data on Blaw-Knox Road Forms; Curb and Gutter Forms; Sheepsfoot Rollers; Truck Mixers and Agitators; Truck Turntables; and Steel Forms for General Concrete Construction.

You should have a copy of Bulletin No. 2036. *Send for it.*

BLAW-KNOX DIVISION of Blaw-Knox Company
2067 Farmers Bank Building, Pittsburgh 22, Pa.

*See your Nearest Blaw-Knox Distributor.*

BLAW-KNOX CONSTRUCTION EQUIPMENT

# Heat Rubber-Asphalt Joint Sealer Carefully

**Predetermine the Best Temperature For the Joint Sealer You Use, Then Maintain It Closely While Heating**

✦ FOR some years joint-sealing materials composed of blends of asphalt and rubber or rubbery synthetics have been used for sealing joints in concrete pavements. However, the service performances of joint sealers of this type have shown variable behavior, ranging all the way from superior to unsatisfactory. Such variation has been noted not only on the same projects, but also on different projects with materials from the same source.

### Heating Determines Performance

The major reason for this variation seems to stem from the manner in which the compound is heated and handled. Tests indicate that rubber-asphalt compounds should be heated to closely controlled optimum temperatures predetermined for each particular blend. But since the rubber in the compound acts as a heat insulator, it is not easy to obtain a uniform heat throughout the mixture.

If heat is applied directly to the kettle, two problems are encountered: (1) excessive heat causes a breakdown in the chemical composition of the rubber, rendering the compound useless; (2) the heat is prevented by the insulating effect of the rubber from melting the compound in the center of the kettle.

Special kettles have been developed to overcome this difficulty. They work on a double-boiler principle using heated oil or some other heat-transferring material within the jacket to distribute the heat uniformly to the inner kettle. Fully automatic controls insure uniform heat in every part of the inner kettle or pot containing the sealing compound, thereby producing a material of the desired pouring consistency without danger of overheating.

The best pouring temperatures for rubber-asphalt compounds range from 385 to about 450 degrees. However, it is important to check with the compound producer to determine the specific proper operating temperature for the particular joint sealer being used. Some manufacturers recommend also that the compound be well stirred while being heated. And one stresses that the thermometer be placed at least 8 inches deep in the material during heating and be read while stationary, without taking it out of the compound.

### Recommendations Based on Tests

Five commercial joint sealers from four sources were recently tested under Federal Specification SS-F-336. These tests were reported by Richard H. Lewis, Senior Chemist of The Division of Physical Research, Public Roads Administration, in *Public Roads* for January, February, and March, 1947. The following recommendations are based on those test findings:

1. Users of this type of material should provide for closely controlled temperatures during heating with no possibility for local overheating.
2. The optimum temperature for the particular filler should be accurately determined and maintained during the heating period within narrow limits.
3. The batch being heated should not be held at pouring temperature for extended periods.
4. Some effective mechanical means of pouring to expedite the placement of the sealer material should be developed, to insure that the material is not unduly injured before it is placed in the joint.

In pouring the material, care should be taken that the joints are free from scale and foreign substances. A steel brush and air compressor to blow all the loose materials and dust out before pouring are recommended. Concrete must be dry at the joint.

"THIS C.I.T. check HELPS US BUY THE EQUIPMENT WE NEED TO HANDLE OUR CONTRACTS MORE PROFITABLY"

CONTRACTORS continue to tell us that they increase their profits through the use of construction equipment purchased with C.I.T. funds. Here's a typical example:

The successful bidders on a highway job needed new equipment costing $100,000 to handle the work efficiently and economically but the cash outlay would impair their working capital. To conserve their funds for pay rolls, supplies and other operating expenses, they turned to C.I.T. for assistance.

C.I.T. financed 75% of the total; purchases were made from several different distributors and, as deliveries were made, a C.I.T. check completed each purchase. The entire amount was amortized over two years through monthly payments. The contractors acquired equipment which started to pay for itself immediately out of operating savings and increased earning capacity.

You can buy construction equipment by making only a moderate initial investment and conserve your working funds the way this firm did. LET C.I.T. FURNISH THE MONEY TO COMPLETE YOUR PURCHASE. Large or small amounts are available, promptly and at reasonable cost, with repayment spread over many months. Get in touch with these offices for rates, terms and full information.

*Send for NEW booklet which tells you how we finance construction equipment.*

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To connect with truck simply lower tail gate and back truck under fifth wheel, elevate dump body to remove weight of trailer from retractable support standards. Lower body, raise and latch tail gate and trailer is ready to roll. There are no pins or bolts to fasten. Easily connected by one man in less than five minutes.

1. Low Bed
2. Designed for transporting construction equipment and other heavy materials quickly and economically
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4. Available in capacities 10 to 25 tons

*We also manufacture conventional Goose Neck Trailers for tractor operation. Write for information to:*

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"While There's Life There's Hope"

Give HOPE to the 1 in every 8 persons now doomed to die of cancer, and to their families as well.

*Send check or money order to*

The National Cancer Foundation
85 Franklin Street, New York 13, N. Y.

## Highway Engineers Scarce Because Salaries Are Low

Lack of trained engineering personnel is hampering road-building programs in 40 states. The low salaries offered have been the main reason for this shortage, according to a survey made by the American Road Builders' Association.

Between 6,000 and 10,000 engineers are needed to carry out the 1947 construction schedule. But present salaries now lag behind the salaries paid in comparable Government work, or those recommended by the American Society of Civil Engineers. Twenty-nine states report that they cannot compete with these higher salaries.

States having the greatest need are Illinois, where 1,000 engineers are required, New York which needs 977, and California with a shortage of 500 engineers.

During the war, some 20,000 trained men left state highway departments to enter the armed forces or war industries. Of this number, 59 per cent have returned to their old jobs, according to the survey. A wide variance is noted, ranging from 5 to 10 per cent in some states to 100 per cent in Montana and Rhode Island.

Questioned about their engineering procurement, 37 states answered that they had no arrangement with state engineering colleges for training returned GI's who had war experience in road or airport construction. Half of the states announced working arrangements with technical schools for securing their graduates. Several states reported that these arrangements included employing students on road projects during the summer months.

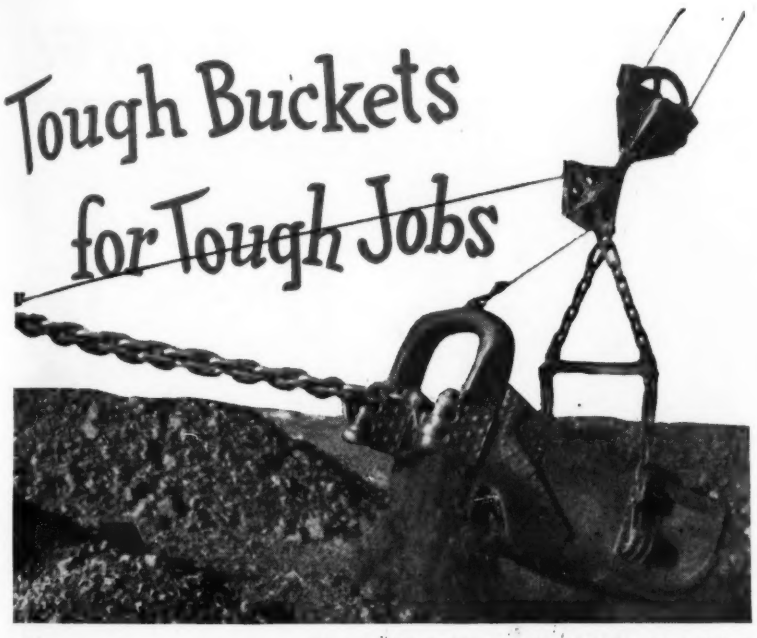
## Caterpillar Appointments

Lee L. Morgan has been appointed district representative for Caterpillar Tractor Co. in Alabama and central Tennessee. He succeeds C. M. Adams, who recently took over a similar post for the district covering Indiana, Kentucky, and part of Ohio.

Kirby Matthews will be district representative to serve dealers in Montana and Alberta, Canada. He succeeds Kenneth F. Ames who has been assigned to special duties in the General Sales Department.

R. J. Loskill, former Central Division Credit Manager, has been appointed a Central Sales Division district representative. He will serve these distributors: Gibbs-Cook Tractor & Equipment Co. of Iowa; Halladay-Dettman Co. of South Dakota; Lincoln Equipment Co. of Nebraska; and Missouri Valley Machinery Co. of Nebraska.


# Tough Buckets for Tough Jobs



*4½-yard ESCO standard weight dragline bucket with vertical pin hitch plates, working on Marion electric. Hitch plate extensions are in upside down position for special pitch adjustment.*

If you are like most contractors, you judge a dragline bucket by two measuring sticks:

1. **Will it dig maximum payloads?**
2. **Will it stand up on the job with minimum maintenance expense and loss of time?**

Contractors working on the Grand Coulee irrigation project in Washington state bought their buckets by these standards. *And on this job — one of the country's biggest and toughest — are 21 ESCO buckets used by all six contractors.*

Here's how *ESCO* dragline buckets measure up:

### Light Weight—Big Payloads

Weight is reduced without sacrificing strength, through hollow arch construction and use of *ESCO* manganese steel for parts subject to wear and shock. Since this steel work-hardens in use, parts need not be made excessively heavy to allow for wear.

### Efficient Digging

Streamlined tooth holders are cast as part of the cutting lip. No bulky tooth holders to offer resistance in digging. Outside tooth holders located in extreme corners of the lip give full bite.

### Long life on the Job

*ESCO Manganese Steel* resists both shock and abrasion, polishes with use, reduces friction. This adds to the life of the bucket, keeps maintenance costs and loss of time at a minimum.

### A Bucket to Fit Your Job

*ESCO* dragline buckets are made in three types — medium, standard and heavy duty. One of these buckets will do your digging job with less trouble and more profit. Catalogs describing these buckets are yours for the asking. Just fill in and mail the coupon below.

**ESCO** *Manganese Steel* FOR ULTIMATE ECONOMY

**ELECTRIC STEEL FOUNDRY**

2169 N. W. 25th AVENUE, PORTLAND 10, OREGON

OFFICES

CHICAGO, ILLINOIS — NEW YORK CITY, N. Y.
EUGENE, OREGON — SAN FRANCISCO, CALIF.
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IN CANADA — ESCO LIMITED, VANCOUVER, B.C.

ELECTRIC STEEL FOUNDRY
2169 N.W. 25th Ave.
Portland 10, Oregon

Please send catalogs on ESCO dragline buckets to:

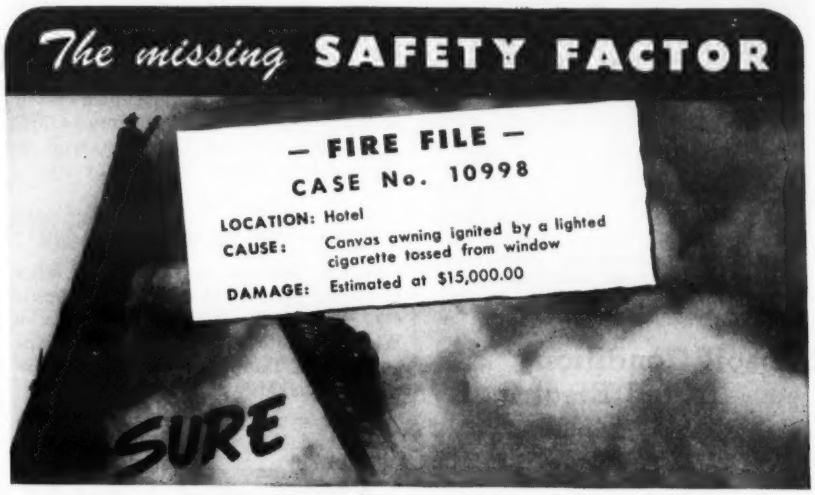
Name_____

Address_____ Zone____

City_____ State_____



# The missing SAFETY FACTOR


— FIRE FILE —
CASE No. 10998
LOCATION: Hotel
CAUSE: Canvas awning ignited by a lighted cigarette tossed from window
DAMAGE: Estimated at $15,000.00
SURE

## MAYBE YOU DON'T USE AWNINGS BUT···

a similar report might be written about *you* nevertheless. It might have been a truck "tarp," a welding curtain, protective covering over inflammable materials, or a boat cover instead of an awning. It might have been a spark from a welder's electrode or a burner's torch instead of a cigarette. In any case, the missing safety factor is *flameproof fabric.*

## FLAMEPROOF FLAMEFOIL CANVAS REDUCES FIRE HAZARDS

Impregnated by a patented* finish, the flameproof protection of FLAMEFOIL Canvas will not wear off nor wash out, lasts as long as the fabric itself. When you use and specify Flameproof FLAMEFOIL Canvas your equipment lasts longer, resists wear, and requires fewer replacements. The reason is . . .

## FLAMEFOIL'S 4 POINT PROTECTION

Water Resistance — Weather Resistance — Mildew Proofing — Fire Proofing

## INVESTIGATE THE ADVANTAGES OF THESE OTHER FLAMEFOIL PRODUCTS

**FLAMEFOIL FABRIX**
Flameproof, light weight fabrics that combine safety with unusually wide range of use. FLAMEFOIL Fabrix is great for mattress ticking, an effective answer to the "bed smoker" problem.

**FLAMEFOIL BEAUVAN**
Simulated leathers in beautiful colors and grains. A truly great product for upholstery, seat covers, decorations, table tops in bars, lounges, restaurants and other public rooms where fire hazards are always problems.

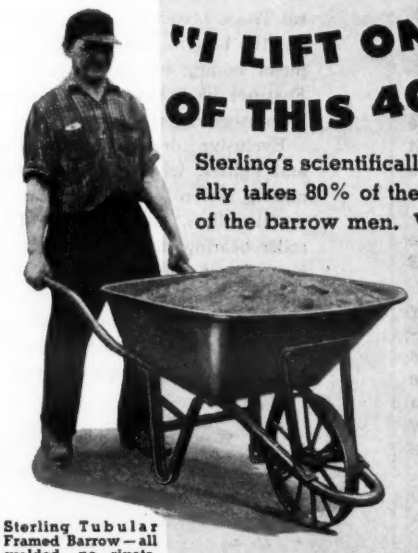
FLAMECOTE Canvas Finish—FLAMEPROOFS ORDINARY CANVAS
Easily applied FLAMECOTE Canvas Finish makes ordinary canvas flameproof, resistant to water, weather and mildew, in 9 eye-appealing colors, and white, it makes drab-looking canvas bright and new. In one-quart, one- and five-gallon containers.

*Manufactured under Pats. No. 2,299,612 and 2,044,176. Others pending.

FLAMEFOIL PRODUCTS — PHILADELPHIA TEXTILE FINISHERS, Inc. NORRISTOWN, PENNA. — W. L. BARRELL CO., NEW YORK — Sales Agents for FLAMEFOIL Canvas



# "I LIFT ONLY 80 LBS. OF THIS 400 LB. LOAD!"



Sterling Tubular Framed Barrow—all welded, no rivets, lapped at corners. Steel re-inforcing rod around top edge.

Sterling's scientifically balanced construction actually takes 80% of the load off the arms and backs of the barrow men. With Sterling Wheelbarrows, crews work faster, make more trips, haul more yardage per day. And quality, all-welded construction keeps Sterlings on the job longer, reduces job costs.

*Deliveries* of Sterling all-steel, tubular framed barrows are being stepped up as rapidly as the material situation permits.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

This Gish-Rooney earth resistivity apparatus for determining subsurface geological conditions can locate and measure depth to bedrock, faults, water-bearing layers, gravel, etc.

## Subsoil Conditions Tested Electrically

Equipment for determining subsoil geological conditions by means of electrical resistivity is produced by the Geophysical Instrument Co., 1820 No. Nash St., Arlington, Va. Based upon principles developed by Gish and Rooney of the Carnegie Institution of Washington, it is said to be able to locate and measure depth to bedrock; locate faults and other geological features, water-bearing layers, and gravel deposits; and give information concerning stratification of overburden.

With this equipment, the known variable electrical conductivity of different soil materials is used to chart underground conditions by interpretation of potential changes between electrode rods driven in the surface at fixed distances apart.

The Gish-Rooney apparatus includes a precision potentiometer for measuring this difference. A motor-driven precisely constructed commutator is mounted below the panel of the unit, with the necessary filters and shields to avoid disturbance to measurements by the action of the motor and commutator.

The measuring apparatus is furnished separately or in a complete outfit. The equipment includes a battery power supply, metal ground stakes, lightweight aluminum-alloy cable reels, lightweight high-strength field cables, connecting leads and instructions for use.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 48.

## Heavy-Duty Trailers

A line of trailers for transporting heavy construction equipment is made by the Talbert Construction Equipment Co., Lyons, Ill. The manufacturer states that one man can perform all operations necessary to remove or attach the cable-operated gooseneck, a feature of the line. Talbert trailers are made in 12 models.

They have an all-steel electrically welded frame construction. Longitudinal flooring is of oak. Skid boards and lashing rings are provided. The spring-suspended rear assembly has a Hendrickson walking beam. Bendix Westinghouse individual air brakes are provided.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 35.

## Roller Company Dissolved

It is announced that the Hercules Roller Co., purchased in 1944 by the W. A. Riddell Corp., Bucyrus, Ohio, has been dissolved. In the future, Hercules rollers will be manufactured by Riddell and merchandised through established distributing channels.

## GMC Announces New Line

A series of dealer meetings was held by the Truck & Coach Division of the General Motors Corp. during June to discuss sales plans for the future. Highlight of the meetings was the announcement of a new line of light and medium trucks.

The new line includes complete restyling, new cab construction, and engine and chassis advancements, according to the company spokesmen. Other topics on the program were the new parts and accessories warehouse system of the Truck & Coach Division of GMC, and parts merchandising as well as truck service plans.

## Wico Opens Wis. Offices

A new Milwaukee, Wis., sales office has been opened by the Wico Electric Co., West Springfield, Mass., maker of Wico magnetos. The address of the office is 710 Bankers Bldg., 208 E. Wisconsin Ave., Milwaukee 2, Wis.


MANGANAL
T.M. Reg. U.S. Pat. Off.
11 to 13½% Manganese-Nickel Steel
HOT ROLLED PLATES AND APPLICATOR BARS
Rebuilt This Bucket Like New!

BEFORE NOW

Worn out Shovel Bucket on scrap line. Same bucket rebuilt with Manganal Hot Rolled Plates and Applicator Bars.

This bucket owned by the Five Indian Tribes, Muskogee, Okla., was rebuilt with one small piece of 1" thick Manganal Hot Rolled Plate, one 4 x ¾" Manganal Applicator Bar and 50 lbs. 3/16" Manganal special Tite-Kote Welding Electrodes. Put your scrap pile back to work economically and quickly with Manganal.

WRITE FOR FREE Booklet on "The Welding of 11 to 14% Manganese Steel."

NAME OF NEAREST DISTRIBUTOR UPON REQUEST

STULZ-SICKLES CO.
Sole Producers
91 N. J. Railroad Avenue, NEWARK 5, N. J.



GET A LOAD OF THIS LOW-COST MIXING!

Speeding to your construction work, the new Ransome Blue Brute Horizontal Truck Mixer has a way of turning out the best in concrete at costs that mean money in the bank for you. Features like these are the secret of its always expert performance:

Exclusive drum design, stronger and lighter, with Ransome's famous mixing action . . . chilled car wheel metal rollers, each on two Timken roller bearings and running on extra-heavy, heat-treated track . . . smooth, positive gear-and-pinion drive . . . improved transmission with single lever control, two speeds forward and reverse, separate engine clutch and multiple disc reversing clutches . . . trouble-free water system with enclosed pump-clutch, leak-proof poppet valves and unbreakable anti-freeze gauge glasses.

Built with capacities of 2, 3, 4½ cu. yds., this new Ransome Truck Mixer is easier to start, to control, to maintain —a sure bet for time-saving, economical concrete production in transit.

Up above, of course, that's another Blue Brute leader — a Ransome "Big" Mixer — top performer at so many central mixing plants and big-time construction jobs . . . and another reason why *there's more worth in Worthington-Ransome.* R7-4

KNOW YOUR BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your planning on a profitable basis.

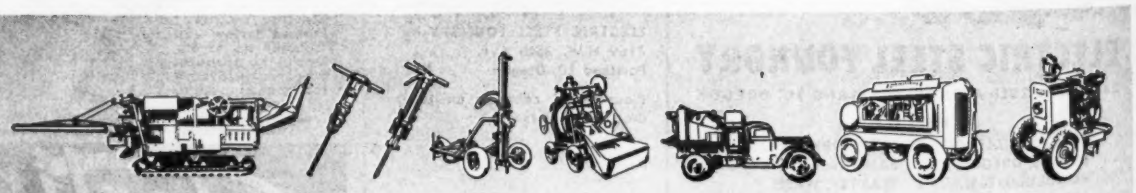
RANSOME EQUIPMENT
Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

WORTHINGTON EQUIPMENT
Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON

Worthington Pump and Machinery Corporation. Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

## Steel Outlook Bright; U. S. Facilities Ample

The present annual steel capacity of more than 91,000,000 tons would seem to be ample for our future needs for many years to come. This conclusion was stated recently by Wilfred Sykes, President of Inland Steel Co., Chicago, in an address before the 55th General Meeting of the American Iron & Steel Institute.

Mr. Sykes based his conclusion upon an analysis of the domestic per capita demand for steel for the period 1920 to 1940; this analysis indicated that the peak per capita consumption amounted to 978 pounds in 1929. He pointed out that this peak consumption rate, plus allowance for 6,000,000 tons of steel for export, would keep about 84 per cent of the industry's capacity in operation in 1950, and about 86 per cent in 1955. He said these figures seem to indicate that no expansion in ingot capacity is required in the near future.

Mr. Sykes pointed out some of the reasons for our present short supply of scrap, and indicated that this condition would continue for some time to come. One reason, he said, is that the steel being made today lasts longer than steel made years ago; this durability will tend to decrease the rate of scrap return over future years. Another factor lies in the increasing tonnages of light-gage rolled products, little of which ever returns as scrap.

Mr. Sykes predicts that technological improvements in iron and steel-making will be evolutionary rather than revolutionary. Continued research will open new fields, and better quality coupled with low prices will lead to new uses. He feels that light metals and their alloys will not make inroads on the steel industry, as they will create their own fields.

## Truck-Tire Pamphlets

Folders describing four new types of Lee Super DeLuxe truck tires have been released by the Lee Tire & Rubber Co. of New York, Inc., Conshohocken, Pa. One folder describes the Lee Logger tire and the Lee Rural Service tire for on-and-off-the-road service; another, the Lee Rock Service tire for off-the-road operations such as quarrying; and the third, the Lee Highway Traction tire.

The folders feature cutaway sketches showing how the tires are built up. They also point out the salient features of each type of tire, and tell how each is especially adapted to the use for which it is designed.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 75.

## Disston Elects President

Jacob S. Disston, Jr., has been elected President of Henry Disston & Sons, Inc., manufacturer of saws, and other cutting tools. Mr. Disston, who was Vice President for fourteen years, succeeds S. Horace Disston, who has advanced to Chairman of the Board.

# We may not get rich but...

... our ditch-digging jobs are really paying off these days. We've found the combination that really adds up to more profit per job.

Our Oliver "Cletrac" dealer was the man who gave us the tip. We were sitting around the shop one day, and I was doing a little beefing about the cost of replacing some worn-out ditch-digging equipment. "I can show you how to do that and save money," he laughed. "Just get a Sargent Overhead Shovel and one of their new Backhoes. Mount it on your Oliver "Cletrac" tractor and you've got a complete ditch-digging outfit. The Backhoe will dig a trench up to 6½ feet deep in any kind of going. The bulldozer on the Overhead will do the back filling, and the Overhead Shovel itself will load out the excess earth. You can even use it to lay the pipe. There's real efficiency and economy of operation. That Backhoe mounted on a Cletrac can dig up to 200 feet per hour, and you can make the changeover from Backhoe to Overhead in an hour and a half."

Sounded good to us and we tried it. Talk about efficiency. That's the best deal I ever bumped into. That Oliver "Cletrac" dealer sure knows his business and he's a big help in ours!

OLIVER Cletrac SALES SERVICE

"THE SIGN OF EXTRA SERVICE"

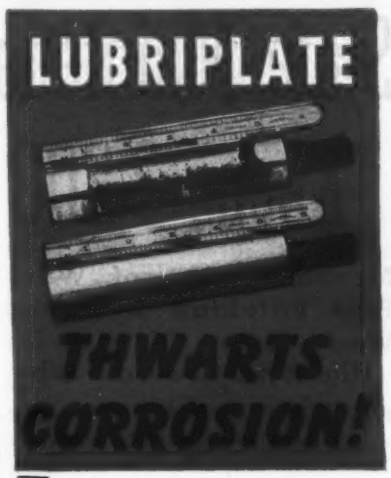
**Cletrac**

**a product of**

**The OLIVER Corporation**

**Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio**






These originally identical shackle pins from a ten ton truck were used in a comparative lubrication test for a period of one year. A well known conventional lubricant was used on the upper pin. Note the pitting from corrosion, also the excessive wear. LUBRIPLATE was used on the lower pin. Its surface remained bright and true as when the test began, proof that LUBRIPLATE is different . . . better.

**LUBRIPLATE**

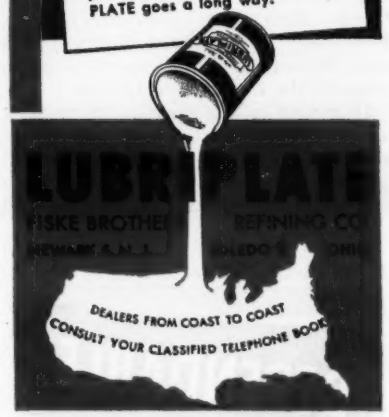
Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

**LUBRIPLATE**

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

**LUBRIPLATE**

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.





**CONTRACTORS AND ENGINEERS MONTHLY**

**470 Fourth Avenue, New York 16**

Enclosed is my remittance of $3 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

Name _____

Position _____
(Or Type of Business)

Address _____

(City) _____
N. B., Cash, check or postage stamps will be entirely acceptable.

# State Maintenance District Keeps 2,200 Miles in Shape

## Mechanization of Work Plus Patching for Long Wear Helps District Do High-Type Low-Cost Job

✦ THERE is work aplenty in District 2 of the New Mexico State Highway Commission. Perhaps the shortest way of telling how much is to say that there are 2,200 miles of modern highways requiring full-time maintenance. Between 1,600 and 1,700 miles are covered with high-speed bituminous riding surface.

Add to these 2,200 miles some 600 which require part-time attention by state maintenance forces, and you will have some idea of the job.

How well the work has been mechanized is illustrated by the fact that District 2 has over 100 pieces of heavy equipment, and one maintenance employee to every 22 miles of highway!

District Engineer T. B. White qualified that by explaining, "Of course, that's less than the number of men we should have. With the skilled-help situation easing off somewhat, we hope to have more men—at least through the summer's peak resurfacing season."

With district headquarters in Roswell, New Mex., Mr. White regularly covers that big road system, putting in many hours a day on the road. Maintenance foremen know him by name, for he has been in the Highway Commission now for about 21 years, 10 of them at Roswell.

### Highway Conditions Vary

District 2 is one of five in New Mexico. It covers the southeast quarter of the state, and takes in the counties of Otero, Eddy, Lea, Lincoln, Chaves, Roosevelt, DeBaca, and Curry. This vast territory is located on the eastern slope of the Continental Divide.

It covers a wide range of terrain. Towards the west, mountain peaks reach 9,000 feet into the clouds. Roswell headquarters are 3,657 feet high. Fading south towards the Texas state line are the agricultural irrigated areas of Artesia and Carlsbad, where some of the finest cotton in the southwest is raised.

The climate of the region varies from hot, dry summers to severe winter weather in the high mountains. The dry, sunny climate over much of this district definitely favors the construction and maintenance of highways. So does the abundance of caliche and other lime formations native to southeastern New Mexico.

Highway revenues for the state are low, however, and for that reason a high type of maintenance must be done at the lowest possible cost. That is why it has been mechanized. That is why the experimental work of richer states is studied. It is a reason why, with maintenance work barely holding its own during the war years, better and better maintenance was constantly the ultimate objective. Now a few pieces of new equipment are coming in, and the quality of maintenance work is steadily rising.

(*Continued on next page*)

*C. & E. M. Photo*

**A motor grader and a tractor-drawn sheepsfoot roller, in the background, road-mix and pulverize an old oil mat with native earth during resurfacing work in District 2 of the New Mexico State Highway Commission.**


DEPENDABLE

BREAKDOWNS ON BIG CONCRETE JOBS COST MONEY. VIBERS ARE DEPENDABLE.

VIBER
Concrete Vibrators

Jobs can be completed ahead of schedule, with VIBER'S unmatched speed-9,500 RPM, *in concrete*. Send for Viber Catalog.

VIBER COMPANY
SINCE 1931
726 SO. FLOWER STREET
BURBANK, CALIFORNIA
OF INTERNAL CONCRETE VIB



UNIT'S "Big 3"

Designed for FASTER and EASIER OPERATION . . . where the Going is TOUGH!

UNIT 514
½-Yard Dragline

UNIT 1020
¾-Yard Shovel

ALL *Unit Models are Convertible to ALL Attachments*

UNIT 357
5-Ton Mobile Crane with Magnet Attachment.

Here are three time-tested UNIT machines that continue to "make the headlines" because of their unusual speed, efficiency and all-around dependability. Check the following exclusive UNIT features: *Compact, streamlined design . . . Straight line engine mounting . . . Drop forged alloy steel gears . . . Automatic traction brakes . . . Interchangeable disc type clutches . . . One-piece cast gear case* . . . and above all, UNIT's safety-promoting *FULL VISION CAB*. No other excavator on the market has all these features.

CONTACT FACTORY DIRECT *for Price and Delivery*

UNIT CRANE & SHOVEL CORP.

UNIT CRANE & SHOVEL CORP. UNIT MILWAUKEE WISCONSIN

6309 W. BURNHAM ST.
MILWAUKEE 14,
WISCONSIN, U.S.A.

# Maintenance District Looks After 2,200 Miles

(*Continued from preceding page*)

### Maintenance Details

For patching and resurfacing of main-line highways, District 2 has adopted both road-mixed and penetration-type aggregate-asphalt patches, put on in the field. Using a 200 to 300-penetration asphalt for the penetration type of work has produced a tight but flexible pavement free of cracks for years.

Stockpiles of rock aggregate are put up all over the district by a Cedarapids portable crushing plant. The crusher works steadily almost all year turning out stockpiles for the fast-moving asphalt crews.

In the early summer, black-top highways are often re-sealed to improve the riding surface, provided they have not deteriorated to the point where re-mixing is necessary. For sealing, one of the District's Littleford distributors is used to spread 200 to 300-penetration asphalt at the rate of 0.35 gallon to the square yard. The District also owns two large Kinney distributors, and they are used for long jobs. The oil is applied on half the road at a time, with flagmen at each end of the operation to control traffic.

Dump trucks then haul crushed rock rapidly to the job. They back up over the 200-degree hot oil and lay the rock about 25 pounds per square yard through Buckeye and Spred-O-Matic spreaders. A 10-ton smooth roller, usually an Austin-Western or Buffalo-Springfield then beds the rock aggregate thoroughly into the bitumen. A freshly sealed project does not look "oily". Neither does the slow-curing asphalt bleed in the hot summer weather.

Each spring, however, there are certain sections that through the winter have developed a number of rough places. Some sections develop potholes. Such places are marked for resurfacing.

A motor grader from a fleet of twenty Caterpillar, Austin-Western, and Adams machines rips up the bad piece with its rooter teeth. It turns all this material up into a windrow, and a sheepsfoot roller makes repeated passes through the old asphalt cake to break it up into small pieces. Some of the base material is mixed in as the motor grader alternates with the sheepsfoot roller in its processing.

If additional material is needed to bring the place up to grade, it is hauled by the dump trucks from stockpiles. Only after the windrow has been thoroughly dried and aerated is the asphalt hauled to the job. About 5 per cent of MC-3 penetration bitumen is then applied, and the windrow is mixed and re-mixed by the motor-grader blade. The small, broken pieces of the old asphalt paving blend in with the mix.

When the windrow is thoroughly mixed, with no free asphalt or uncoated particles in evidence, a new cake is laid down in thin laminations and consolidated by pneumatic-tire and smooth rollers. Ordinarily in resurfacing a piece of highway, traffic is routed over the shoulders or the right-of-way. The new work goes in full width over the roadway.

Road-mixing or sealing work requires the finest kind of timing and coordination, as well as proper weather. Always the operation is planned to take out as many of the mechanical variables as possible. The most dependable shovel is sent to the stockpile to load dump trucks. The best trucks are put on the job. A distributor that has had a recent mechanical checkup is used. Asphalt heaters of known high capacity are put on the job. The personal caliber of maintenance employees in District 2 is high, and the human equation fails less frequently than some unpredictable mechanical one.

For large resurfacing jobs or long sealing stretches, Mr. White uses a special district-wide oiling crew. This crew has its own equipment, bunk houses, and cook shack. It works anywhere in the district. It even has its own traveling service unit on a Dodge truck, which brings grease, lubricating oil, diesel fuel, and gasoline from nearby sources to the job.

A smaller oiling crew is used for scattered patch work, or for small jobs not requiring so much material. During the winter months a great many small-scale sealing patches are put on, and the first resurfacing of the spring is usually torn up and pulverized in late winter. The best maintenance men are kept busy all winter, and they lose no time from weather if they are willing to work at something.

White has taken a great deal of over-specialization out of his district, and put each employee on a basis of productivity. This is not to say he runs stop-watch studies; far from that. He simply calls out all hands when there's a job to do.

### Mowing and Roadside Work

In the summer, when normal rainfall sprinkles down over this broad land, grasses and weeds spring up in profusion on roadsides and shoulders. Five new International mowers mounted on International tractors were recently purchased for this season's use.

They are being used in early and late summer on the modernized sections

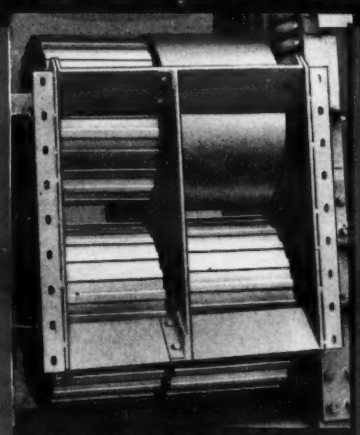
(*Continued on next page*)

**MOVING?** Be sure to give us 30 days' notice of your change of address—and let us have your old as well as your new address.

Unless you do this you may skip an issue or two before the correction is made—and you won't want to be missing any issues of CONTRACTORS & ENGINEERS MONTHLY these days!

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Ave., New York 16, N.Y.

SENSATION OF THE GRAVEL PIT


Feed opening view TwinDual Rolls

Only UNIVERSAL Offers TWINDUAL* ROLLS

Two stages of secondary reduction in one crusher. Doubles normal primary jaw crusher output. Its use in gravel plants is the greatest achievement in a generation. The only really new and different post war plant being offered on the market today.

*PATENTED

No equal for capacity where crushing must be done. In field tests, under identical pit conditions, production is more than double the output of larger, standard conventional plants.

FEATURING

- THREE STAGES OF REDUCTION WITH ONLY TWO CRUSHERS
  FIRST STAGE—JAW CRUSHER
  SECOND AND THIRD STAGES—TWINDUAL* ROLLS
- TOP CAPACITY WITH MINIMUM WEIGHT AND POWER REQUIREMENT
- ROLLER BEARING THROUGHOUT FOR SMOOTH, BALANCED OPERATION
- READY PORTABILITY, QUICK AND EASY SET-UP
- MEETS HIGHWAY REQUIREMENTS

WRITE FOR COMPLETE INFORMATION

UNIVERSAL ENGINEERING CORPORATION
820 C Avenue N. W., Cedar Rapids, Iowa

40 YEARS OF PROGRESSIVE SERVICE TO THE CRUSHING INDUSTRY

# Maintenance District Looks After 2,200 Miles

(*Continued from preceding page*)

where embankment and cut slopes are gentle. But there are a number of miles in service where embankments built to the obsolete standards of another year prevent even a mower from working. Those are the places where embankment slopes are steep: 1½ to 1 or more.

The District is doing a great deal to these old roads by widening the shoulders and easing embankment slopes with new fill. A Caterpillar elevating grader is used to good advantage, digging and casting direct. Sheepsfoot rollers and motor graders then compact the material in thin lifts, and when the jobs are finished the highway is safer, seems much wider. The bad fire hazard caused by high growths of weeds along the embankments has also been eradicated.

Blading of native caliche and gravel on shoulders is a must. It has a high priority in the maintenance program. Unless this blading is done often, traffic whips out a hole at the edge of the asphalt pavement and dangerous potholes then develop. This is especially true in the winter months.

### Snow Removal a Problem

The most vexing winter problem is snow removal. It can get bad enough through the mountains to tie up traffic for a day or two. Last winter snowplow crew members had to be rescued when high winds closed the highway behind their machine almost as fast as they could shove the snow aside.

Valley snowfall in the lowlands is wet, but high on the mountain slopes the snow is fine, dry, and powdery. Since the worst snow-removal problem is up in the mountains where most of it falls, an FWD truck with a new Wausau plow was recently purchased and put in use. During the winter months, this machine stays in the Roswell yard, gassed, equipped, and ready to leave at a minute's notice.

The District also has several all-wheel-drive International wartime trucks, which it uses to perform a much-appreciated service. During snowstorms these trucks go out on patrol, fully equipped with chains and a towrope. Motorists who are stuck, but need only a little help to get out, get that help from these patrols.

Removal of snow is started the minute a highway is covered, and continued until all highways are clear. When there is a choice to be made, the highest priority must be given to the fast transcontinental routes through the district, of course.

### Drainage and Water Run-Off

For some time, New Mexico has been the victim of dry years. Vegetation dried up, died, or was eaten by range cattle. The ground surface became hard and crusted.

Insignificant showers falling on the ground in that condition have rolled off like water on a tin roof, flooding drainage structures and nullifying all drainage formulae. Erosion of embankments has been aggravated.

"We've got a good example of this out at the Roswell Army Air Base," White explained. "That big field is almost all paved, with drainage leading through a system of sub-drains to a main storm drain. The storm drain crosses one of our highways, and any rain we have fairly floods the highway there."

Mowing and roadside development will no doubt start good root systems of native grasses and shrubs to combat this erosion. It is now generally conceded that the proper development of roadside grasses is benefited by regular mowing.

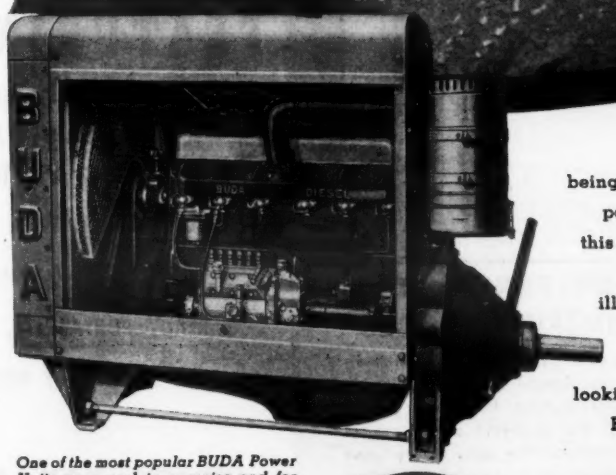
### Organization and Finances

District headquarters are set up to function efficiently, speedily, and with a minimum of regulations or red tape. Mr. White is a district engineer who works hard to keep all the fine details of such an organization at his fingertips. An Associate Member of the

(*Concluded on next page*)

*C. & E. M. Photo*

**New Mexico's District 2 maintenance men use asphalt and aggregate to produce a long-wearing patch. Because highway revenues for the state are low, a high type of maintenance must be done at the lowest possible cost.**

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# Maintenance District Looks After 2,200 Miles

(Continued from preceding page)

American Society of Civil Engineers, he prefers to be somewhere in the field keeping in touch with a job.

Maintenance projects are supervised under his direction by S. S. Willis. The professional pride of a good engineer plus community loyalty is evident in District 2 maintenance work, for many of the men, in addition to Mr. White, have been on the job there for a long period of time. They have watched the roads through that western state develop over the years.

Maintenance finances are controlled through the state offices at Santa Fe. District 2 is currently allotted about $17,000 per month for the routine maintenance of its 2,200-mile system. Special funds are set up for extraordinary maintenance. The gravel and natural graded-earth part of that system, totaling perhaps 600 miles, can be kept in good shape at relatively low cost by a motor grader and operator. Overall maintenance costs are around $88 per mile per year.

District headquarters also supervises directly the activities of project engineers on new construction jobs. The office has its drafting rooms and engineering-survey crews. All new construction is ordinarily done by contract.

### Bridge Construction Halted

The wartime scarcities of treated bridge timbers and structural steel for new construction have slowed the bridge building and maintenance work to a halt. By a peculiar Federal ruling, the State was able to purchase a limited number of prefabricated bridges from a west-coast concern, but they had to be assembled at the factory before the State of New Mexico could purchase them.

A flash flood recently teamed up with a careening truck to lower a bridge deck about 3 feet. State crews used exposed sandstone ledges in the stream bed to set false piers, and they jacked the bridge deck back to its original elevation. It may last for years if no more careening trucks or flash floods come along.

With new automobile traffic streaming along New Mexico highways (traffic counts never dropped in District 2 even during the war), it is not just enough to keep pace with maintenance as highways develop small failures. The avowed objective in New Mexico is to improve the old roads, to build new ones as rapidly as possible, and to make a fair highway system much better as time goes by.

## New Cotton Work Gloves

Production is under way on a new type of cotton work glove. Its availability has been announced by the Riegel Textile Corp., 342 Madison Ave., New York 17, N. Y. The manufacturer claims that after numerous company and field tests, it can guarantee the Super Canton work gloves to outwear canvas gloves. They are said to be soft, flexible, water-repellent, and to have a non-slip surface.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

## Reduction-Crusher Data

A catalog describing its Type TY reduction crusher is being distributed by the Traylor Engineering & Mfg. Co., Dept. A, Allentown, Pa. Bulletin 4112 is a 22-page review of the TY, its features, construction, method of installation, method of operation, specifications, and other pertinent information. It contains a complete parts list, and a table of sizes and approximate capacities of the Type TY reduction crushers. Also included are instructions for assembling, erecting, lubricating, operating, and repairing the unit. The last page of the bulletin contains a table of the comparative hardness of various rocks.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 78.

## Equipment Rental Guide

The fourth edition of the Associated Equipment Distributors "Compilation of Rental Rates for Construction Equipment" is now ready for distribution.

In making the announcement, the AED points out that this schedule is for informational purposes only. It is not intended to suggest or to influence the rates or terms of rental of any item of equipment. That is a matter which must be determined by the lessee and the lessor of the equipment involved.

The schedule will be revised or supplemented from time to time on the basis of representative samplings made among various distributors in the United States, in order to reflect changes that take place.

Copies are obtainable from the AED Executive Office, 1928 Eye St., N. W., Washington, D. C., at the rate of $3.00 each. Checks in payment must accompany the order.

## Chrysler Reassigns Two

The return of John T. Condon to the Sales Department of the Chrysler Division, Chrysler Corp., Detroit, has been announced. As Sales Executive of the division, he becomes a member of the General Sales staff.

He is succeeded in his former position as Manager of the Industrial Engine Division by John C. Hammelef.

WHAT INTERESTS YOU MOST IN A ROAD ROLLER OR MAINTAINER?

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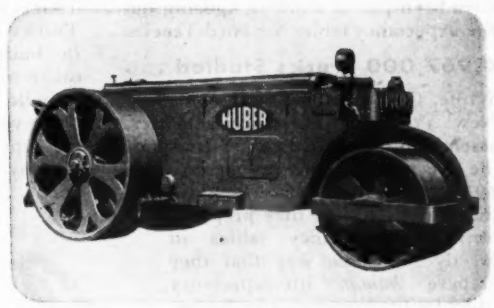
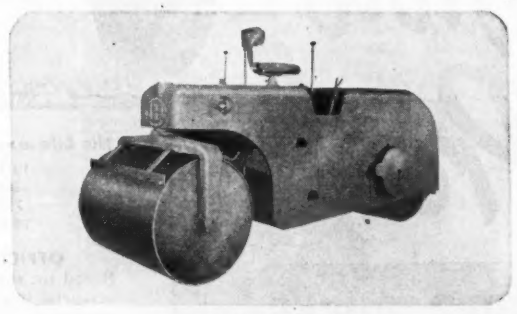
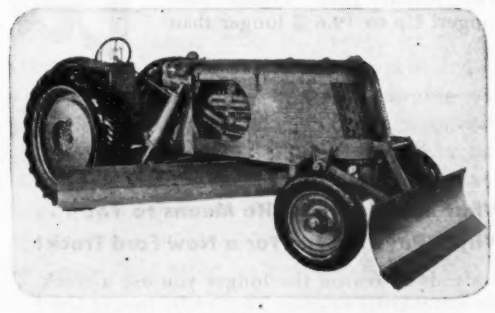



HUBER 3-Wheel ROLLERS
Automotive type, built in sizes from 5 to 12 ton.



HUBER TANDEM ROLLERS
Variable weight, built in sizes from 3 to 12 ton.



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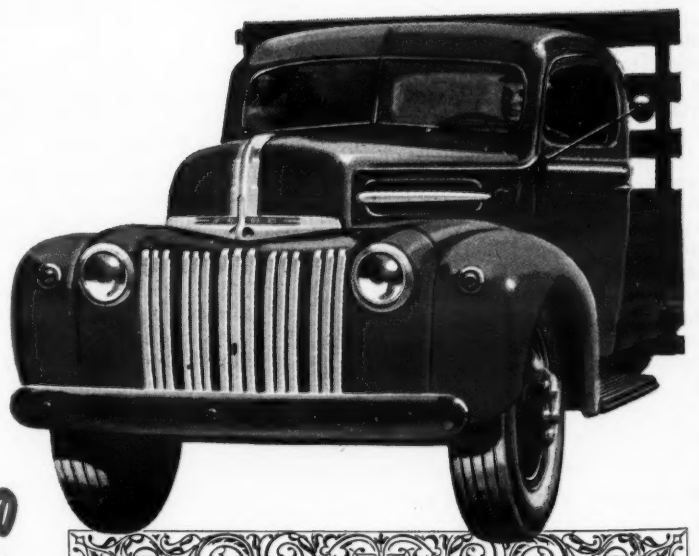

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**FORD TRUCKS LAST LONGER!**

# Ship Canal Dredged Between Two Rivers

## Provides Access to Lay-Up Area for Merchant Ships; Two Dredges Cleared Land And Dug 20-Foot Channel

✦ A NEW ship canal, 12,470 feet long and 20 feet deep, was dug last winter to connect the Mobile and Tensaw Rivers in southern Alabama. The waterway is located about 12 miles north of the gulf port of Mobile. It now gives access to a vast lay-up area along the banks of the Tensaw River for a portion of the big fleet of surplus merchant vessels that this nation now has left on its hands.

A $149,731.20 contract for digging the canal was awarded to the Sternberg Dredging Co. of St. Louis, Mo., by the U. S. Corps of Engineers, Mobile District. The project itself is part of the U. S. Maritime Commission's general program to provide berthing facilities for its merchantmen.

Two dredges did practically all the work. The long-boom clamshell dredge Conical handled the clearing as it cut a pilot channel. The suction dredge Duplex followed in its wake, pumping out the remainder of the 1,857,216 cubic yards that had to be excavated. The job was completed between November 8, 1946, and February 10, 1947 in less than the allotted 100 working days.

The Mobile and Tensaw Rivers are formed as the Tombigbee and Alabama Rivers lose their identity about 35 miles above the head of Mobile Bay. The two former rivers then flow south on a parallel course through some of the wildest and most primeval land still to be found in the state, where alligators slither along the muddy banks of the tributary bayous, and where bird and game are found in abundance in the uninhabited swamps and forests.

Between Cochrane Bridge at Mobile and the west end of the new canal, the Mobile River has a 20-foot channel and sufficient width to provide berthing facilities for 300 vessels at one stretch along the right bank. At a paralleling point and for some distance northwards the Tensaw is even deeper and wider. Its waters make an ideal inland harbor for lay-up usage, out of the way yet within short sailing distance of the Gulf of Mexico.

But the deep waters of the Tensaw could not be readily reached by ocean-going vessels. The upper parts of Mobile Bay are crossed by an 8-mile-long causeway in the vicinity of the mouth of the Tensaw; this causeway does not provide bridges large enough to pass large ships. Thus freighters and cargo carriers would have to use the channel skirting the shore near the city of Mobile, and then cut back east towards the Tensaw. Moreover, that way is shallow in places. And considerable dredging of shoals and sand bars would have to be done in this delta area, with constant maintenance to follow in order to keep the channel open.

### Big-Boom Conical

The site chosen by the Corps of Engineers for the canal took advantage of one natural body of water, Big Briar Creek, which emptied into the Tensaw. From the right bank of the Tensaw the line of the canal follows the creek inland for a couple of thousand feet to where it bends sharply northwards. From this point the new canal continues its course straight across the narrow 6,000-foot isthmus to the left bank of the Mobile River.

A 500-foot right-of-way was obtained across this neck of land, but only 300 feet of this had to be cleared. A crew of 50 men with crosscut saws leveled the 45 acres of thick woods, mostly black gum, within a month, clearing the way for the dredges. None of the timber was moved; for the time being it was left lying where it had fallen.

*U. S. E. D. Photo*

**As it cut a pilot channel, the clamshell dredge Conical used its long boom and bucket to pick up large felled trees and set them along the edge of the 300-foot strip cleared for the Mobile Tensaw canal.**

The clamshell dredge Conical then cut a pilot canal, 70 feet wide x 10 feet deep, across the low-lying marshes which had an average elevation of 2½ feet above mean low tide. It dug its own flotation with a 6-yard clamshell bucket that had been enlarged to 10-yard capacity. At the same time it utilized its long 240-foot aluminum boom to pick up with the bucket the large trees that had been felled, and set

*(Continued on next page)*


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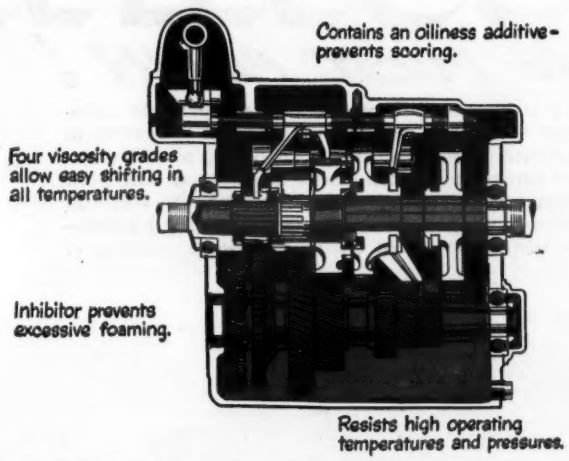
RPM Gear Lubricant (Compounded) will not form deposits in gear cases and is non-corrosive.

It comes in four grades: SAE 80, 90, 140, 250 and is recommended for all automotive transmissions and all differentials (except hypoids) where compounded gear lubricant is specified. (RPM Multi-Service Gear Lubricant should be used in hypoid differentials.)

*RPM Gear Lubricant (Compounded) is recommended for most enclosed gears except hypoids.*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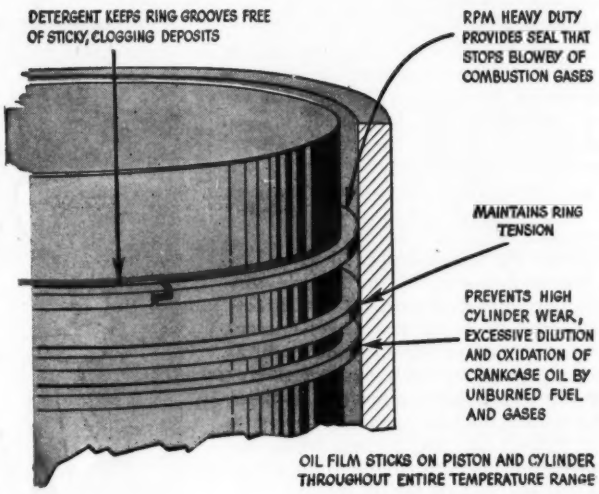
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FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

# Ship Canal Dredged Between Two Rivers

(*Continued from preceding page*)

them out of the way along the edge of the 300-foot cleared strip. In this manner the heavy timber was handled only once; if smaller equipment had been used, two handlings of the cut trees and stumps would have been required to clear the site.

The diesel-electric-powered dredge has a steel hull 50 x 150 x 9 feet deep. It moved itself ahead by throwing its bucket forward and by working its three spuds, two of which are located on the port side and one on the starboard. Manned by a crew of 22, the Conical advanced an average of 300 feet a day, digging the pilot channel and clearing as it went. Its part of the operations was completed by the middle of January.

The Conical received its name from the large truncated cone which supports the boom and counterweight, giving the unit a distinctive appearance. The supporting cone is of ½-inch steel plate 62 feet high, 30 feet in diameter at the bottom, 10 feet in diameter at the top, and rising 53 feet above the deck. The cone is reinforced with a central I-beam and upright channels laid back to back against the cone from bottom to top. Additional bracing is furnished by cross members. The base of the cone is fastened to four girders about 30 feet long set at right angles to each other and welded to the bottom of the barge.

The entire frame, consisting of the boom and counterbalance, is hung on the top of the cone on 19 conical bearings rolling on two machined surfaces and floating in oil. To prevent lateral motion, the top of the cone is built with a portion of the frame overlapping it, forming another bearing also covered with oil.

Power for the dredge is furnished by a Busch-Sulzer 1,000-hp 2-cycle air-injection diesel engine. It is direct-connected to a 225-kw direct-current generator and a 319-kva alternating-current generator by means of thirty-six 1-inch rubber-composition V-belts. The direct current supplies power to the motors on the drives, while the alternating current supplies power for the various pumps, lights, welding outfits, and other services.

All the operating machinery as well as three large bins for sand are carried by the counterbalance. The sand compensates for the exact weight of the boom and Williams bucket. The entire frame section is swung by 1⅜-inch cables, double for strength.

### Suction Dredge Duplex

In the meantime the diesel-electric suction dredge Duplex had begun work, also at the east end of the canal. There it extended the channel out to the middle of the Tensaw River from the right bank, along which the water flowed 30 feet deep. Then Big Briar Creek was deepened from an average depth of 10 feet to the 20 feet called for in the contract, plus another 2 feet to cover any inaccuracies in the dredging process. The extra material thus dredged was paid for at full contract price, since 130,000 cubic yards, place measurement, was permitted as overdepth dredging. The width of the new channel is 150 feet at the bottom and about 300 on top, with 3 to 1 side slopes in the land cut, and 5 to 1 in the creek and out in the Tensaw River.

*U. S. E. D. Photo*

**The suction dredge Duplex moved ahead an average of 200 feet a day on the Sternberg Dredging Co. canal contract. Following in the wake of the Conical, it pumped out the rest of the 1,857,216 cubic yards that had to be excavated.**

The Duplex is an all-steel dredge with a hull 50 x 140 x 9 feet deep. It is powered by three diesel engines, two having 1,360 hp each and the third rated at 800 hp. This total of 3,520 hp drives the main pump at 1,600 hp, and also generators to run the various electric motors. One 300-hp motor turns the 60-inch cutter head; a 250-hp motor raises and lowers the ladder; a 75-hp motor works the two stern spuds; a 60-hp motor runs the swing line which passes through sheaves on two forward booms on each side of the dredge, and then out to ship anchors dropped either in the water or along the bank as the dredge swings on a 300-foot arc when necessary. The Duplex is self-propelled with twin screws, each of which is driven by a 300-hp motor; but it utilizes its spuds for advancing while at work.

The pump has a 28-inch intake and a 25-inch discharge. It dredged from 32,000 to 36,000 cubic yards in the average pumping time of 21½ out of 24 hours. The Duplex moved ahead an average of 200 feet per day, 5 feet at a

(*Concluded on next page*)


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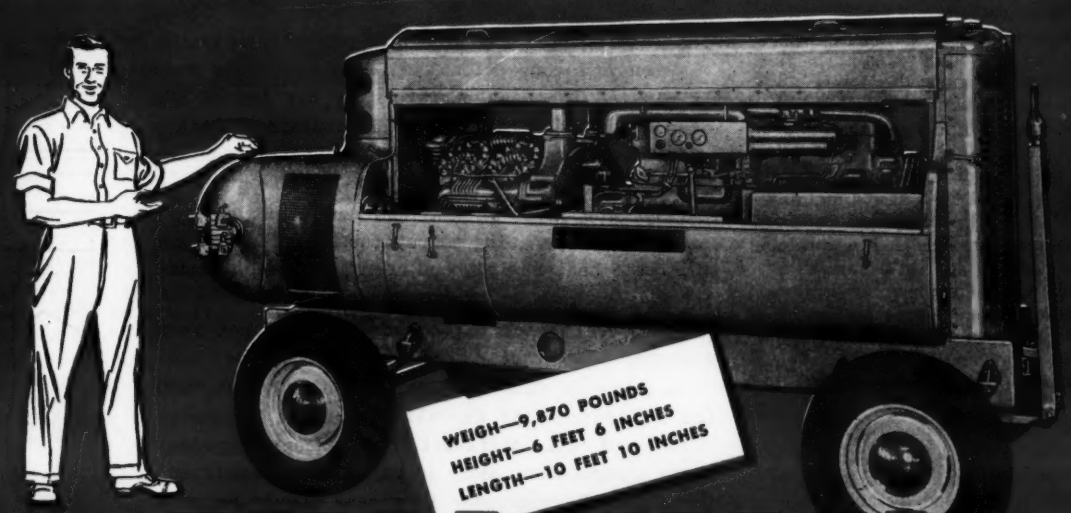


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# Ship Canal Dredged Between Two Rivers

(Continued from preceding page)

time as it swung, taking out 5-foot-deep cuts before the ladder was lowered for another swing. The dredged material consisted of about 85 per cent sand and the rest silt and clay. It was pumped through a floating line ranging in length from 200 to 1,300 feet, with the average around 800 feet. A derrick barge with a 40-foot A-frame handled the pipe.

When dredging in the Tensaw River or Big Briar Creek, the material was spoiled in areas located downstream from the new channel so that during high water it would not be washed into the canal. In the western part of the canal, cut solely through the land, the spoil banks were on the south side. The Duplex was manned by a crew of 60; this included the force handling the land line, which did not exceed 1,000 feet.

### Lay-Up Area

The new canal provides access to the deep-water area in the Tensaw River above the east end of the canal. This could not have been reached otherwise, except by considerable dredging in the lower part of the river and around its mouth in Mobile Bay. Moreover, it is a shorter sailing distance up the Mobile River and through the canal to the site than up the Tensaw; the latter has a winding channel which would also increase the charges for tugs.

About 650 vessels are expected to be laid up in the new basin where the mean tidal range is only 1.4 feet.

To service these vessels and keep them in shape so that they may readily be put back in commission will require several hundred workers. A new settlement will be built for these men along the eastern shore of the Tensaw River, for there is no way of reaching the site from Mobile except by boat. A suggested location is the old ghost town of Blakeley. It is now deserted, but it was built over a hundred years ago as a commercial rival to the port of Mobile across the bay. It was eliminated as a threat to Mobile when an epidemic of yellow fever wiped out the entire population. But there is now a possibility that the old town will have a small-sized boom again.

Administration offices for the lay-up area, including docks and landing piers, will be constructed at Lower Hall Landing and Sizemore Landing on the east shore of the Tensaw River about 1 and 4½ miles, respectively, above the canal. Access roads will be built to these locations from the nearest town, Bay Minette, which is on U. S. Highway 31 and the L & N Railroad.

### Personnel

For the Sternberg Dredging Co., H. B. Donham was Superintendent in charge of the operations of the Conical, while Captain R. C. Paulk served in a similar capacity on the Duplex. T. A. Johnston was Resident Engineer of the Mobile Field Suboffice, U. S. Corps of Engineers. The Mobile District is headed by Col. Mark M. Boatner, Jr., District Engineer. Dupree Hays is Chief, Operations Division, while Ulysses L. Perry is Chief, Civil Works Branch of the Operations Division.

## FWD Sales in Southwest

A sales headquarters for its southwestern sales region has been set up by the Four Wheel Drive Auto Co. This territory includes the states of Oklahoma, Texas, New Mexico, Arkansas, Louisiana, and Mississippi. Offices will be in the Masonic Bldg., Duncan, Okla., and will be under the supervision of William C. Merrill, Sales Manager for the region.

FWD dealers under Mr. Merrill's supervision are the Halliburton Oil Well Cementing Co., Duncan, Okla.; Wolfe Distributors, Oklahoma City, Okla.; Boyce Curran Machinery, Inc., Baton Rouge, La.; The Myers Co., Las Cruces, N. Mex.; R. A. Young & Son, Fort Smith, Ark.; and Southern Equipment Sales, Ltd., Jackson, Miss.

## Dealer's Address

The address of the Ehrbar Equipment Co., recently appointed Gradall distributor in northern New Jersey, was erroneously reported in our May issue. This company is located in Union, N. J.

## Belting Line Resumed

Production has been resumed on its Maltese Cross conveyor belting by the Hewitt Rubber Division of Hewitt-Robins, Inc., 240 Kensington Ave., Buffalo 5, N. Y. It is offered in straight-ply, stepped-ply, and shock-pad construction.

Features claimed for Maltese Cross belting are extra strength; greater flexibility; longer service life; resistance to abrasion, weathering, aging, heat, and sun-checking. It is said to have high flexing qualities and resilient rubber frictioning between plies. The cover is anchored to the carcass by a Dura-Bond breaker strip.

It is made in a special construction for handling hot materials. Where oil-resistance is important, Hewitt continues to recommend its Monarch Neoprene belting.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 49.

## Marlow Pump Founder Dies

Alfred S. Marlow, founder and President of the Marlow Pump Co., Ridgewood, N. J., died recently at the age of 62. Mr. Marlow founded his company in 1924. He was born in Coventry, England, and came to this country in 1903.

LaPlant-Choate scrapers are the only job-proved, completely modern, postwar models with all these profit-making features: 25% easier loading — lower horsepower requirements — faster, cleaner, smoother spreading — positive forced ejection — open bowl — no useless dead weight — low center of gravity — modern, high strength alloy steel — modern, high natural rubber content tires — sturdy construction — low maintenance cost and high trade-in value. As the result, operating records on hundreds of tough earthmoving jobs, working in all kinds of materials, prove that LaPlant-Choate scrapers outperform other leading scrapers by wide margins.

Now, look what this performance means in dollars and cents. Even if you were able to obtain other scrapers at half price, within six months you would have been way ahead by buying a new LPC scraper. Within a year, you would be better off even if you got the other as a gift. Then, for thousands of hours, your profits will roll in still faster.

Any way you look at it, no matter what kind of scrapers you are using now, you'll be money ahead by replacing them with modern, job-proved LaPlant-Choate units. Another advantage, too, is the fact that LPC scrapers in most sizes (from 2 to 14 yd. struck measure) are ready for *immediate delivery*. Your nearest LPC distributor can tell you how hundreds of contractors are using "higher income" LaPlant-Choate scrapers to bid lower and still make profits. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, Calif.

**LOOK HOW MUCH MORE MONEY YOU CAN MAKE WITH MODERN LaPLANT-CHOATE SCRAPERS**

NOTE: Estimated earning capacity based on an average haul of 800 ft. and return, at 25 cents per yard based on 50 minute hour.

| Scraper | LaPlant-Choate C-108 (Struck 8.4 yds.) | A (Struck 8.2 yds.) | B (Struck 8.7 yds.) | C (Struck 8 yds.) | D (Struck 8.5 yds.) |
|---|---|---|---|---|---|
| No. of yds. per hr. | 74 | 63* | 65* | 64** | 61*** |
| Estimated earning capacity per hr. | $18.50 | $15.75* | $16.25* | $16.00* | $15.25* |
| Estimated earning capacity for 1000 hrs. | $ 18,500 | $ 15,750 | $ 16,250 | $ 16,000 | $ 15,250 |
| 3000 hrs. | 55,500 | 47,250 | 48,750 | 48,000 | 45,750 |
| 5000 hrs. | 92,500 | 78,750 | 81,250 | 80,000 | 76,250 |
| 10000 hrs. | 185,000 | 157,500 | 162,500 | 160,000 | 152,500 |
| 15000 hrs. | 277,000 | 236,250 | 243,750 | 240,000 | 228,750 |

*Manufacturer's own figures. **Estimated. ***Government tests.

LaPLANT-CHOATE

Positive FORCED EJECTION SCRAPERS

FIRST in Value because they're FIRST in Performance!

## Convention Calendar

**Aug. 6-8—Western Highway Officials**

Annual meeting, Western Association of State Highway Officials, Florence Hotel, Missoula, Mont. R. H. Willcomb, Convention Manager, State Highway Department, Helena, Mont.

## Construction-Cost Stabilization Urged

Steps to help stabilize construction costs were recommended at the spring meeting of the Governing and Advisory Boards of The Associated General Contractors of America, Inc. It was the feeling of the Board members that the public should not be led to believe that there will be quick or drastic reduction in construction costs. However, they expressed the following opinions:

(1) Although conditions in the industry vary widely in different sections of the country, as a general trend construction costs are reaching their peak and becoming stabilized. (2) During a period which cannot be foreseen accurately, construction costs may decline gradually until they reach what can be considered the new normal levels. (3) Decreases in wage rates are not foreseeable without a depression. (4) However, reductions in costs will come about through increased productivity of workmen, development of more economical methods of construction, and other factors.

Some steps the Boards recommended to general contractors throughout the country include: (1) Where it is the normal custom of the contractor, and to the fullest extent possible, firm prices should be quoted to the owner. Contractors should require firm prices from subcontractors and sellers of materials and machinery. (2) Fair and just wages should be paid to workmen, and all possible steps should be taken to encourage workmen to produce a day's work for a day's pay, to maintain wage rates for agreed-upon periods of time, to settle disputes without stoppage of work, to eliminate wasteful practices, and to permit the training of adequate numbers of apprentices to supply additional skilled craftsmen for the industry. (3) All possible steps should be taken to improve the efficiency of management. (4) Where possible, owners should be discouraged from demanding the completion of projects at speeds which require overtime work at premium rates of pay, or procedures requiring extra costs.

The subject of a continuous public-works program was also brought up. The Boards adopted the following statement of policy recommended by the Heavy Construction and Railroad Contractors' Division: "Future development of communities and of the nation can be retarded by over-drastic curtailment of public-works construction. The position of our association has been, and still is, that public-works construction projects should be undertaken only to fulfill a definite need for the physical improvement. To attempt to curtail public-works construction below that point will be detrimental to proper development of communities and the national economy . . ."

An orderly development of public works tends to minimize inflation and depression periods. "The deferment of Federal public works until periods of unemployment leads to sporadic bursts of construction activity with a resultant increase in costs to the Government. When construction programs drastically fluctuate in size from year to year, Government agencies are not able to retain competent personnel necessary to administer their programs. When public-works construction is carried out each year according to a long-range planned program fitted to the country's needs, both Government departments and contractors can organize to carry out the planned work efficiently . . ."

## New Shaft Eliminates Compressor Vibration

A new-type crankshaft said to eliminate air-compressor vibration and rocking has been developed by the Davey Compressor Co., Kent, Ohio. It is known as the Davey Equi-Balanced crankshaft.

It is said to spread compressor working strokes evenly over the full 360 degrees of crankshaft rotation. In 60 and 105-cfm V-type compressors, the new design employs a two-throw crankshaft with throws spaced at an angle which is the supplement of the V.

The Equi-Balanced crankshafts are now being employed on Davey Air Chief portable compressors, Auto-Air, Track-Air, and industrial compressors. Absence of rocking and vibration permit savings in compressor installation and maintenance, and the employment of higher operating speeds, Davey points out.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 97.


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NEW THROUGHOUT

COMPLETELY NEW IN DESIGN
37.5 Drawbar Hp.
Weight, Approximately 11,000 lbs.
2-Cycle GM Diesel Power

NEW PERFORMANCE...NEW WORK CAPACITY...NEW SIMPLIFIED SERVICING

Instant starting.

Quick pick-up.

Fast maneuvering.

Comfortable operation.

Rugged and dependable.

Increased lugging ability because of built-in characteristics of General Motors 2-Cycle Diesel engine.

More footing and greater traction to handle larger loads under a wider range of conditions.

Tractor weight balanced for most efficient drawbar and front-mounted equipment use.

Tractor construction permits separate and convenient removal of major assemblies.

Greasing intervals lengthened—1,000 hours for truck wheels, front idlers and support rollers.

Lubrication fittings reduced in number and made readily accessible.

Adjustments easily reached and quickly made.

*Get the full story of this great, new diesel tractor from your Allis-Chalmers dealer.*

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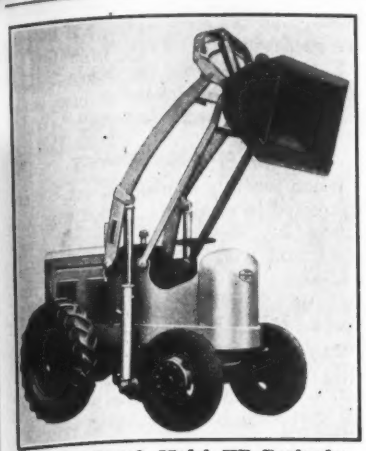
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



The new Hough Model HF Payloader has a ¾-yard shovel. It features single-lever hydraulic control of the bucket and a 4-speed reversible transmission.

## Medium-Size Shovel Added to Loader Line

Production has begun on a new model Payloader by The Frank G. Hough Co. of Libertyville, Ill. The Model HF is made with a ¾-yard shovel; a bulldozer blade, crane hook, cab, and snow bucket are also available.

The bucket is raised, lowered, dumped, and relatched by hydraulic power controlled by a single lever. It may be dumped completely or gradually at any height, the manufacturer says. The automatic bucket tip-back is said to assure full capacity and prevent spillage.

The Payloader has a 4-speed reversible transmission which provides practical forward digging speeds as well as high reverse maneuvering speeds, with a minimum of shifting, it is stated. A single lever shifts gears into speed range, and thereafter forward or reverse is controlled by a directional lever.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 47.

## Soils, Air-Entrainment Reports at ASTM Meeting

Bearing capacity of soils and entrained air in concrete were two of the subjects discussed at the 50th Annual Meeting of the American Society for Testing Materials. The meeting was held at Atlantic City during the week of June 16.

The meeting on load tests to determine the bearing capacity of soil masses was sponsored by Committee D-18 on Soils for Engineering Purposes. The subjects covered included evaluating wheel-load capacity of pavements, designing flexible pavements, the supporting capacity of soil subgrades and base courses, and methods used in Canada, on Philadelphia airfields, and elsewhere.

The symposium committee on air-entrained concrete was headed by A. T. Goldbeck, National Crushed Stone Association. Some of the subjects covered were the effect of sampling errors, effect of blending natural and portland cement, methods used in certain of the state highway departments, etc.

## Quick-Change Gear Lathes

A catalog describing its 13-inch swing lathes, attachments, and accessories has just been issued by the South Bend Lathe Works, 114 E. Madison St., South Bend 22, Ind. Catalog 13-F illustrates in color the features of these quick-change and toolroom lathes.

Features include a quick-change gear box which makes available gear combinations for cutting 48 pitches of screw threads, right or left-hand, and 48 power longitudinal feeds and cross-feeds. Also featured is a double-wall apron which is equipped with a friction clutch to operate the power longitudinal feeds and cross-feeds. The enclosed motor drive provides eight headstock spindle speeds ranging from 34 to 875 rpm.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 77.

## Automatic Dragline Bucket

A 16-page catalog describing its automatic dragline bucket is free for the asking from the Page Engineering Co., Clearing Post Office, Chicago 38, Ill. Topics covered in Bulletin No. 1557 include a short history of the development of the dragline bucket, selecting the right bucket for the right job, and how to use the bucket.

The booklet has been prepared as an aid to getting the most out of dragline buckets, and so a section is devoted to care of the bucket, special buckets, and parts and fittings. Also included is a table of capacities, weights, and dimensions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 86.

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36 pages of money-saving service shop cleaning procedures you will want to know about! Time-saving ways to steam-clean motors and chassis . . . recondition clogged radiators . . . clean cooling systems . . . degrease parts before repair. And many other improved job-cleaning procedures. Write NOW for your FREE copy. No obligation.

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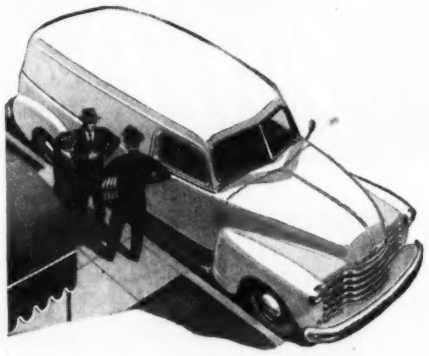

NEW FOUR-POINT DRIVER COMFORT. 1. The cab that "breathes" *draws in* fresh air—heated in cold weather—and *forces out* used air.* 2. Driver's compartment is wider and deeper—more leg room. 3. Bigger, more comfortable seats are fully adjustable. 4. Larger windshield and windows give 22% greater visibility.

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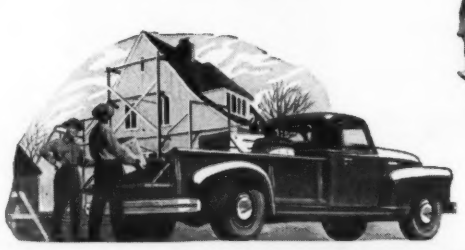
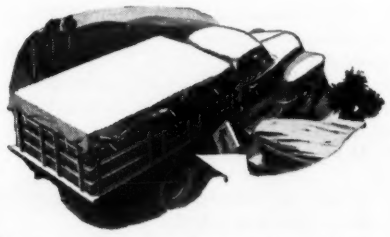
**Fresh-air heating and ventilating system optional at extra cost.*



Chevrolet's FULL-FLOATING HYPOID REAR AXLES are geared for the load. . . . VALVE-IN-HEAD TRUCK ENGINES are world's most economical for their size.



Longer WHEELBASES give better load distribution—increased cab space. . . . HYDRAULIC TRUCK BRAKES—with *exclusive* design for greater brake-lining contact—assure quick, safe stops.

NEW ADVANCE DESIGN **CHEVROLET TRUCKS** FOR TRANSPORTATION UNLIMITED

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT 2, MICHIGAN

PICK-UPS PANELS STAKES CAB-OVER-ENGINE TRACTOR-TRUCKS & CHASSIS FOR SPECIAL EQUIPMENT

# Killer 2-4D Attacks Roadside Weeds, Costs

**What Is It? And What Does It Do? When Is It a Friend, When a Foe? How and When Can It Be Applied To Right-of-Ways, Roadside Parks?**

By W. J. GARMHAUSEN, Landscape Architect, Division 9, Ohio Department of Highways

✦ IT is possible to reduce maintenance costs on right-of-ways and roadside parks by controlling weeds with 2-4D, the Ohio Department of Highways has found.

This 2-4 dichlorophenoxyacetic acid is a plant-hormone-killing solution. It penetrates the hormone throughout the plant tissues and goes into the sap channels for distribution. When taken in by broad-leaved plants in proper proportions, it disrupts their physiological balance and causes gradual death. It comes in the form of an acid-sodium or ammonium salt, or an ester; it can be obtained as a liquid or powder.

### Per Cent of Kill

The per cent of "killer" in these forms varies from 10 to 100. The amount used varies also. But usually the rate is one pound of powder or one gallon of liquid 2-4D per 100 gallons of water per acre. The concentration depends upon what you are spraying for and the conditions at that time: the age and growth of the plant, the temperature, the soil moisture, etc.

The results of 2-4D for weed control have been found very gratifying. Poison ivy is our first objective because it often causes discomfort, medical expense, and loss of time to the men; it is also costly to mow. The per cent of kill for poison ivy has been almost 100.

For other weeds such as bindweed, burdock, ragweed, and wild carrot, the per cent of kill has been about 90 when the application was made in the early growing stage of the weed, and 65 if made at a later time. Canadian thistle needs to be sprayed three times or more before it is finally killed. (And should you want to rid walks and other areas of grass instead of weeds, an application of five times the specified amount of 2-4D will do the trick.)

### Either Friend or Foe

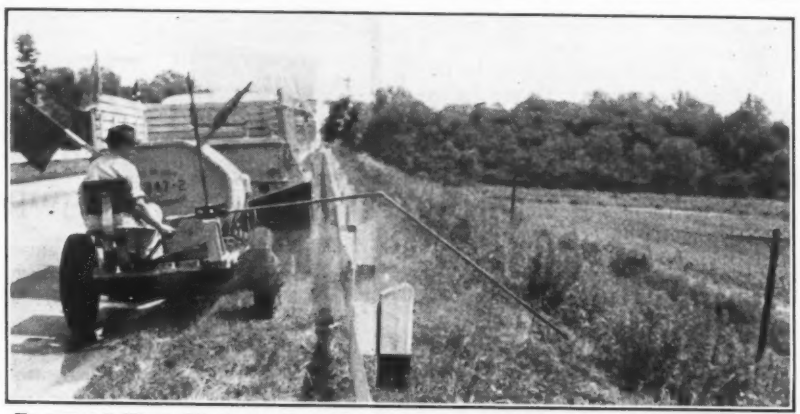
Before giving you our experiences with 2-4D, here are its good and bad points. Within its limitations it can be your friend; through faulty handling or application it can be your foe.

The following are a few of its good points:

1. It is selective in action, being toxic to broad-leaved types of weeds but not to most grasses.
2. Its killing action is permanent, for it attacks all of the plant including its root.
3. It also impairs the germination of seeds.
4. It will not sterilize soil when it is applied *as recommended.*
5. Foliage sprayed as recommended is not hazardous to livestock.
6. It is easy to handle and economical.
7. It does not require activators or penetrants.
8. It is soluble in water.
9. It is effective at low concentrations.
10. It will not stain or injure clothing; it will not irritate the skin.
11. It is non-explosive.
12. It is non-corrosive to spray equipment.

The following are some of its bad points or, as I prefer to call them, precautionary points:

1. After being used for 2-4D, the sprayer should be thoroughly washed if you contemplate using it for the application of insecticides.
2. When you are filling the sprayer, take care that the powdered 2-4D does not blow onto material susceptible to it.
3. And when you are applying 2-4D spray, take care that it does not drift onto valuable or desirable vegetation.
4. Remember that bent grass varies as to its susceptibility. Sweet and white clovers are fairly susceptible; most nursery stocks, vegetables, and flowers are susceptible.
5. And remember that when 2-4D is sprayed on bare ground it may cause temporary soil sterilization.



To spray 2-4D on fill slopes, the Ohio Department of Highways fastens a spray bar to the sprayer high enough to pass over the top of the guard rail. A truck tows the sprayer along, with its operator seated behind it, at about 2 miles an hour.

### Use on Right-of-Way

When treating roadside areas, we are interested in eradicating such weeds as poison ivy, bindweed, burdock, ragweed, and wild carrot. Both the 2-4D acid and the 2-4D salt are used. Pressure is usually maintained at 150 pounds, and the concentration varies from 1 to 2 pounds or gallons for 100 gallons of water. Regardless of the per cent of concentration, the per cent of kill varies slightly depending upon the season of year.

Our methods of application vary. To spray berms, we fasten a spray bar to the sprayer in such a manner as to allow it to swing either backward or forward. The bar is set high enough to pass over the top of the guard rail, and

(*Concluded on next page*)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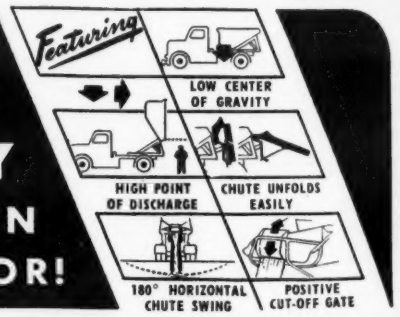


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# Killer 2-4D Attacks Roadside Weeds, Costs

(Continued from preceding page)

it extends 12 feet beyond the sprayer. No. 6 disks are used in the nozzles, which are set far enough apart to obtain a slight overlapping of spray. It is possible to maintain an even cover of spray through the areas to be treated by towing the sprayer along at about 2 miles an hour with its operator seated behind it.

A similar method is used to spray over guard rails along fills and also on short cut slopes.

For narrow right-of-ways where crops or other susceptible plant materials are adjacent to the area to be sprayed, we use a long boom with a reverse neck. This is operated from the truck towing the sprayer. Either a two or a six-nozzle bar is attached. In this way 2-4D can be sprayed into the right-of-way without damaging susceptible plants.

For longer slopes or a deeper right-of-way we use a long boom and a No. 12 disk in the nozzle. Pressure is stepped up to 200 pounds.

### Use on Roadside Parks

The weeds we want to eliminate in our roadside parks, where the grass is mowed, are buckhorn, dandelion, and plantain. All of these are very susceptible, so the concentration is kept at 2 pounds per 200 gallons of water to the acre.

We use a 100 per cent 2-4D acid. As this is not soluble, we add ½ pound of bicarbonate of soda to a pound of 2-4D to 100 gallons of water. The mixing is simplified if you use only 20 gallons of water, then add the soda and acid, and fill the tank to the desired amount only after it is well in solution.

We make the application with 75 pounds of pressure, using a six-nozzle spray bar to cover a large area at a time. The No. 6 special disks on these nozzles give a fan-like spray. In confined areas where the sprayer cannot be driven inside the park, we use 200 feet of 1-inch high-pressure hose. This is sufficient to reach all areas and heavy enough to stand the wear and tear.

No harmful effect on the grass has been apparent. The white clover suffered somewhat, but as we have very little of this in our parks this was a minor item.

### Season for Application

Our observation is that the later the season or the taller the vegetation, the more spray material is necessary. You need to wet the plant thoroughly. So if it is full grown, you will need more spray material to wet it. Doubling the concentration of 2-4D has also been effective.

The time of year for application doesn't seem to matter much as to results obtained. One good authority says to apply when you have the time, that "even a wintertime application kills dandelions when they start their growth in the spring".

Another states that applying 2-4D with fertilizer in the fall of the year is very successful. We have applied it from early spring to late fall with almost a 100 per cent kill. However, I think applications at the time of maximum bloom should be considered. Applying at that time not only gets the plant but also keeps the seed from maturing.

**Poison ivy and miscellaneous weeds along an Ohio right-of-way receive a dose of 2-4D killer from a long boom operated from the truck towing the sprayer unit. Care is taken not to damage susceptible plants near the area to be sprayed.**

### Other Tips on Using 2-4D

Our experience has been that spreaders or stickers in the form of soap or casein have not been beneficial. Esters have been used to better advantage than the acids or salts in the hot dry season of the year. The ester, as you know, has an emulsifiable oil base which contains a sticker.

The ester is hard to clean out of the sprayer. However, one way to retain a clean sprayer is to use a concentrated 2-4D material in a separate container. For the desired concentration use a regulator to induce the spray into your hose water stream. Then simply by changing the hose you keep the sprayer ready for other uses.

We have used various brands of 2-4D at various concentrations, all with about the same results in kill. The liquid types are easier to mix but bulkier to transport.

### Final Evaluation Impossible

What the results of 2-4D spraying will be over a period of years remains to be seen. Its effect on supposedly susceptible vegetation will have to be watched constantly and careful practices maintained. But the Ohio Department of Highways feels that it is a definite benefit because of its proved economy, and therefore will continue to use it.

"BICKNELL BETTER BUILT"
PAVING BREAKER TOOLS

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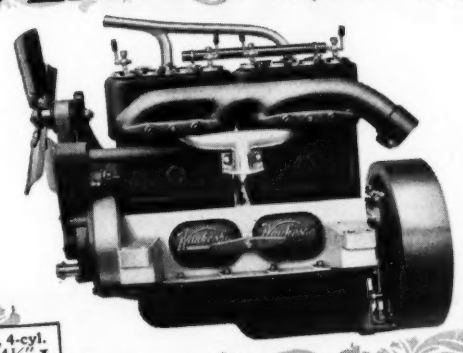

Model L, 4-cyl. 35 H.P., 4¼" x 6¾", 382 cu. in.

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The Waukesha Motor Company is not building pleasure car motors, but is devoting all its energies and resources to the development of the right type of motor for heavy duty service.

Fattening a race horse to give it added weight will never make it suitable for draft horse work, neither will adding weight to a pleasure car motor make it suitable for heavy duty truck or industrial work.

Therefore we have not been handicapped by any inclination to err in the matter of principle but have built solidly, right from the beginning, upon the firm foundation of *correct design*.

**The Elements of Design that Have Made the Waukesha Motor Famous**

1. Large bearings where needed.
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3. Bearing material that excels in strength and wearing quality.
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7. Speeds of maximum torque and H.P. within the governed speed.
8. Waukesha patented governor that does not fall apart and is lubricated by the oiling system of the motor.

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WAUKESHA, WISCONSIN.

an ad with "tell-all" copy **SOLD** this engine **30 YEARS AGO!**

● World Wars . . . I and II . . . have come and gone—but this Waukesha Engine of 1917 goes on . . . and on . . .

But let's hear what Mr. John M. Weed, Superintendent of McAlester Fuel Co., Rockdale, Texas, has to tell us:

"We are pleased that you are able to give immediate shipment of our parts order for "Old Faithful" Waukesha Motor No. 24656 Model L originally sold in 1917, and which we have used since 1919 or 1920.

"The engine is in its original hook-up, that is, it is still driving an Ingersoll-Rand Compressor and, believe me it has made plenty of wind in its lifetime.

"Four years ago while hauling this compressor into our mine pit, the coupling broke and the compressor unit rolled backward, took a sheer drop of fourteen feet, and turned upside down. We turned it over, filled the crankcases, and the gas tank, cranked it up, and much to our surprise and happiness she went back to work making wind.

"The writer has been in this line of work since the age of 16, and in those 40 years or more he has learned that the word *Waukesha* on an internal combustion engine really means something."

**WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN**
NEW YORK • TULSA • LOS ANGELES

## State Survey Rates Highway Sufficiency

To modernize its present primary and secondary road systems, Arizona will require an estimated $100,000,000. According to present anticipated revenues, a 13½-year program will be involved.

This was the estimate made by E. V. Miller, Highway Planning Engineer, Arizona Highway Department, who spoke before the spring meeting of the American Society of Civil Engineers in Phoenix, Ariz. Mr. Miller attributed the obsolescence of the present system to poor planning and shotgun budgeting. He urged avoiding a repetition of mistakes in planning new roads.

The Arizona Planning Survey, he reported, is making a thorough sufficiency-rating study of each highway to avoid obsolescence that may easily occur as a result of ever-increasing traffic and the need for safe roads at higher speeds.

"This study," Mr. Miller pointed out, "rates each highway or portion thereof, using factors of design such as width, curvature, sight distance, surface type, surface condition, and marginal influence, all in relation to traffic volume and speeds. Other factors such as sufficiency of base, sufficiency of surface, accidents, speed and delay, and right-of-way widths may also be included in future studies."

Mr. Miller cited the fact that no post-war project in his state is being designed for less than 24 feet in width. He declared, "Our two-lane roadway design widths are based on daily traffic volumes as follows: under 50 vehicles per day, 26 feet; 50 to 300 vehicles, 28 feet; 300 to 1,000, 34 feet; and 1,000 to 3,000, 40 feet."

Highways carrying over 3,000 vehicles per day should be carefully analyzed, Mr. Miller said, to the end that all reconstruction will eventually become a part of a four-lane design. He also told the civil engineers how aerial photography is being used to obtain "the best alignment, both horizontal and vertical, that the country affords".

## Dozers, Trailers, Rippers

Its complete line of earth-moving and related equipment is described in a catalog put out by the Arrow Mfg. Co., P. O. Box 4120, So. Denver Station, Denver 9, Colo. This equipment includes Arrow dozers to fit Caterpillar, International, and Allis-Chalmers tractors, low-bed trailers, rippers, power-control units, and small rubber-tired tractors.

The catalog lists all parts, gives complete specifications and dimensions, and includes price lists.

Dealers and others may obtain literature from the company. Or use the enclosed Request Card. Circle No. 62.

## Manages Louisville Area

H. C. Wallace has been appointed Manager of Air Reduction Sales Co.'s Louisville, Ky., District. He succeeds the late R. S. Moore. The Louisville District covers the states of Kentucky, Tennessee, and part of Indiana.


# One reliable source for all your ROAD-STEEL needs

Bethlehem Bar Mats ready for placement in new highway being built near Fulton, N. Y. Completely shop-fabricated, with strong clips that hold the bars rigidly in place, Bethlehem Bar Mats are easy to handle and install. They come in sizes and weights to meet the specifications of state highway departments.

Bethlehem Safety-Beam Guard Rail, shown here along a bridge approach in Kentucky, provides a sturdy continuous beam which holds runaway vehicles in check, redirects them parallel to the rail. Rolled of heavy steel plate, it can be installed on any type of post. Safety-Beam Guard Rail is easily visible day or night, and is especially suited for bridges, bridge approaches, along high embankments, and at other hazardous locations.

Are you planning a highway job that's going to call for drill steel? Wire rope? Bar mats? Guard rail? No matter how many different kinds of highway steel may be needed, put your requirements squarely up to Bethlehem.

When you deal with Bethlehem, you get from one source everything—that's right, everything!—in the steel line that you could possibly need in building a highway or highway-bridge. And Bethlehem service saves you time, too, for your complete order is handled as a unit, with individual items scheduled for delivery as you need them.

You'll like Bethlehem's steel service to contractors. Call us on your next highway job.

**LEADING BETHLEHEM HIGHWAY PRODUCTS**

Road Joints • Reinforcing Bars • Bar Mats • Guard Rail Guard Rail Posts • Wire Rope • Hollow Drill Steel • Fabricated Structural Steel • Sheet and H-Piling • Spikes • Bolts and Nuts • Tie-Rods • Timber Bridge Hardware

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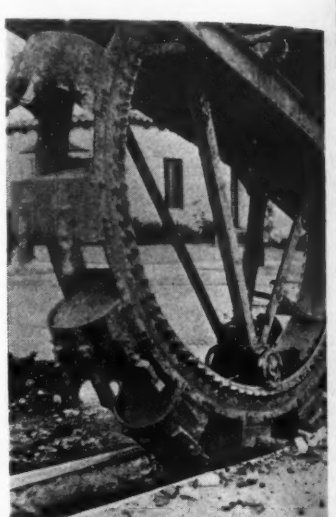

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Hayward Buckets

# County, Without Aid, Paves 100 New Miles

## Hard-Working Commission Heeds Public Mandate to Engineer and Pave Road System With Own Funds

+ A CONVINCING demonstration of democracy at work has come to light out in the new and colorful capital city of Oklahoma. Oklahoma County, without Federal or state aid, has completed 100 new miles of grading and modern asphaltic paving in the past year.

Sparked by three alert commissioners and worked out under the supervision of a county engineer formerly head of construction of the Oklahoma State Highway Department, the plan was introduced to a general vote of the public without fanfare or propaganda.

"Here are the roads you need. They'll cost $4,650,000. Do you want them or not?" the people were asked.

And when the balloting ceased and the smoke cleared, the mandate of a sovereign people was overwhelmingly in favor of the new 154-mile addition to Oklahoma County's paved mileage. A hundred miles has been done in a year by contract under smart engineering management. The other 54 miles are being rapidly built. By the time the present bond issue has been exhausted this year, Oklahoma County will have 300 miles of new and modern pavement in its 1,400-mile county-road system.

This "God helps those who help themselves" attitude does not mean, of course, that Oklahoma County has spurned the State-Federal participating program of secondary roads. There are quite a few new miles planned under that program too, but it has been bound up and slowed to the extent that only 4½ miles of grading could be let last year.

Instead of a 2-inch gravel-asphalt penetration job as suggested under Federal specifications, this County is putting down rock-asphalt pavements and hot mix asphaltic pavements 5 inches thick—pavements that have structural strength in their own right, pavements that will last under traffic counts of 4,000 cars daily, without excessive maintenance bills. For in the final analysis, Oklahoma County will have to foot the maintenance bill anyway.

The three commissioners are headed by Chairman R. L. Peebly, a venerable Oklahoma rancher of nationwide renown. Wise, polished, former mayor Mike Donnelly of Oklahoma City calls many of the plays. And Commissioner Grover Pendleton, young, serious, earnest businessman, comes in for his share of ball-carrying. C. W. McFerron, formerly head of construction for the State Highway Department, is the hard-working County Engineer whose desk is piled high with multitudinous maps and papers screaming "urgent", but whose weather-beaten face is always relaxed and smiling.

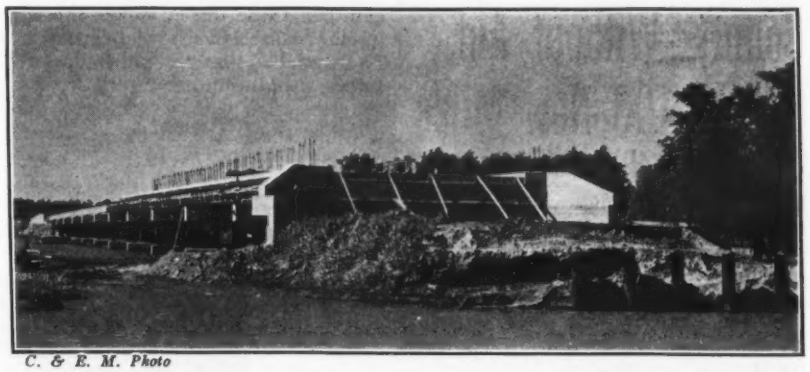
They are a wise lot, these men. McFerron as County Engineer could not act as the consulting engineer to direct the big new road program. He could, and did, resign. The county commissioners could, and did, re-hire him as consultant until that part of the work was done. He could and did then again become County Engineer.

### Obstacles to Program

There were those few, of course, who honestly questioned the wisdom in mid-1946 of letting county contracts for materials. Asphalt, cement, steel reinforcing, bridge supplies, and a host of necessary materials were considered.

Mike Donnelly says today, "We were advised to go slow; that prices would go down and it was foolish to let materials contracts in a hurry. When we decided to act against that advice, there were, of course, a few honest differences of opinion, and we came in for some criticism.

"But here's how it paid off: prices, as you know, have continued upwards. By getting those materials early, our prices of finished paving are only 8 per cent higher than the 1941 average for the same kind of work!



*C. & E. M. Photo*

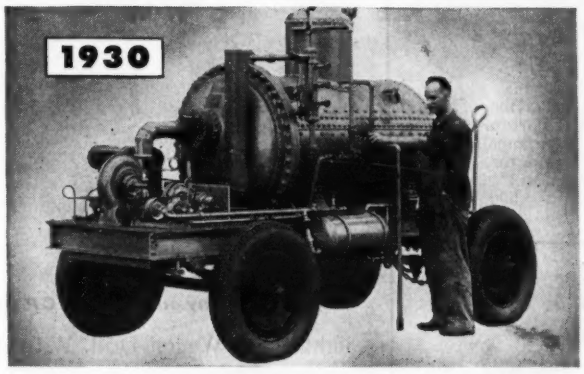
**This is the 720-foot-long steel and concrete bridge across the North Canadian River which Oklahoma County is pushing by contract. It will cost $210,000 and will be a new link between the southern and northern parts of the county.**

"We have been able to make our estimates as close as 3 per cent on finished work. It's checking out beautifully. We *had* to let those contracts. Our people, voting 19 to 1, had said they wanted those roads. There was no point in paying interest on that idle money.

*(Continued on next page)*


# 17 Years at Hard Labor

## and still going strong!




Here's the pioneer model of Cleaver-Brooks tank car heaters. Note the compact, well integrated design. Some of these units are still on the job — giving low-cost heat and steam every day!

Today's streamline unit, much improved, comes in two and three tank car heating capacities. Dry coil steam condensate return — no water or heat losses — high heat transfer — low-cost fuel.

## Most of the Pioneer Models of Cleaver-Brooks Tank-Car Heaters and Boosters built 17 Years ago are still on the job!

A check of service records of hundreds of owners of Cleaver-Brooks tank car heaters and boosters show that units purchased 16 and 17 years ago are still giving economical reliable performance. Right now there are more Cleaver-Brooks tank car heaters and boosters in service than all other makes of similar equipment combined! This equipment is specifically designed to do difficult jobs — the hardest jobs in all kinds of weather and places.

Modern Cleaver-Brooks tank car heaters and boosters, embody many years of experience in use and design. They include every feature that contributes to high efficiency performance and long life. Investigate Cleaver-Brooks bituminous heating equipment. Send for bulletin ...

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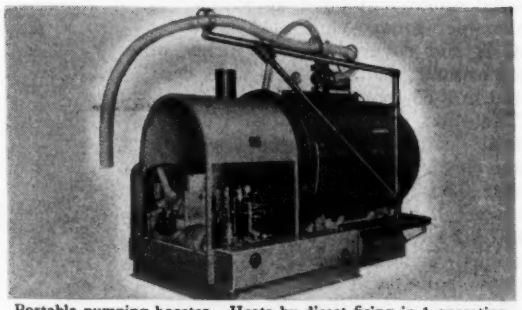
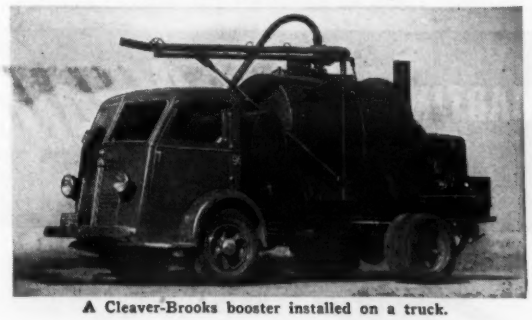


Portable pumping booster. Heats by direct firing in 1 operation. Loads directly to distributor, relay truck or returns to tank car. Available in 2 sizes for truck or trailer mounting.



A Cleaver-Brooks booster installed on a truck.

# Cleaver-Brooks

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TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS



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# County, Without Aid, Paves 100 New Miles

(*Continued from preceding page*)

There was little chance of drawing any interest on it to speak of.

"We thought it was our job to give our people the roads they said they wanted!"

So the contracts were let as rapidly as possible, under competitive bidding, for most of the materials needed. All the good and prominent contractors in central Oklahoma were notified, and all these contractors were assured that the bond issue would be spent entirely by the contract system. They were told to sharpen their pencils.

The result has been materials prices and, later on, performance contract prices low enough that the *Daily Oklahoman* in the capital city has had the courage to urge, editorially, "If the work of the County Board of Commissioners under contract is so much lower than city or state work, why not turn the whole state and city system over to them!" However, the commissioners themselves are the first to point out that state highways, with more traffic, can naturally be expected to run up in price.

### New Work Is Pushed

The new program called for at least eight big contracts. Some of the best grading contractors in the state bid on the earth work. Metropolitan Paving Co. of Oklahoma City, a wide-awake firm which sponsors advertisements in the Oklahoma City newspapers telling John Q. Public the facts about hot-mix asphaltic concrete, joined hands with other good firms like the R. R. Ryan Co. to run the paving.

Since Oklahoma County is comparatively small, with only 720 square miles, the terrain and soil conditions were such that construction design could be fairly well standardized. Two types of new highway were proposed for construction. The first consisted of two courses of hot-mix asphaltic-concrete paving with 2½ inches compacted in each lift; it was to be laid down 18 to 22 feet wide on a selected compacted-earth subgrade, centering within a 66-foot right-of-way.

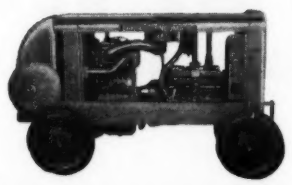
The second type was to consist of 6 inches of selected crushed rock and sand blanket, laid in place on compacted subgrade, topped out with a 0.3-gallon-per-square-yard tack coat of MC-2, and covered with 2 inches of rock asphalt. This also was to be centered in a 66-foot right-of-way.

The men downtown in the ornate marble courthouse building revealed some clever thinking in their specifications. These called for the contractors to have all loads of materials sampled and tested by a licensed, approved testing engineering concern. The wording was such that it meant those firms already long established in Oklahoma City, honest firms. If a load of aggregate had to be turned down, the contractor realized that he had pronounced it unsuitable himself, under his own contract, and went about ordering suitable material with a grin and good grace.

When different jobs in different parts of the county were clamoring for the one set of surveyors, the survey parties were decentralized. A good transitman was put in charge of a party in each of the three districts, and given as many as four men. In good times when work was rushed, he used a whole party. When work slacked down, he was retained as the nucleus of a permanent party familiar with the district, its jobs, and its people, and well able to cope with the problems which come up every day. There was no lost motion, either.

(*Continued on next page*)


it can be done efficiently with CP construction equipment



You can count on fuel savings of 15% to 35% with a CP Portable Compressor, with its economical engine and gradual speed regulator. Models from 60 to 315 c.f.m., gasoline-driven; from 105 to 500 c.f.m., Diesel-driven.

Four feet a minute through gravel is easy with CP-116 Sheeting Driver.

CP Sump Pump starts instantly; simply turn on the air, lower Sump Pump into water and pumping begins.

***One of the many outstanding CP time-savers*** for contractors is the G-200R lightweight Wagon Drill. With its three roller-bearing, pneumatic-tired wheels, it can be moved with ease and speed, even over rough ground, and it will drill holes at any angle. Designed for one-man operation, and fast drilling with the more powerful CP drifter drills.

The complete line of CP construction equipment includes sinker drills, impact wrenches, backfill tampers, sludge pumps, etc. Your CP representative will gladly give you full information on whatever tools you need for any particular job—or write for Catalog 600.

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MARTIN CARRYHAUL TRAILERS
"Make Hauling A Pleasure!"
Ease of loading, dependability and economical operation are three Martin CARRYHAUL Trailer characteristics which make them the leaders in the field.
Regardless of your hauling job, there's a proper size Martin CARRYHAUL Trailer to do it for you safely and economically.

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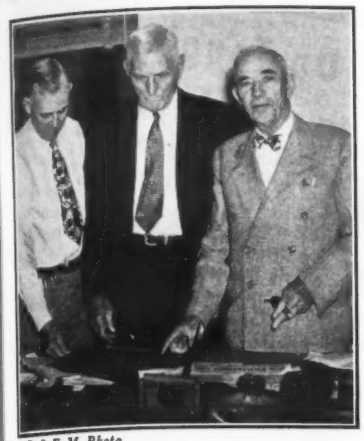
BUYING BONDS
★ ★ ★ ★
***DON'T SKIMP!***



*C. & E. M. Photo*

**Oklahoma County Commissioners Grover Pendleton, Chairman R. L. Peebly, and Mike Donnelly discuss road problems in Donnelly's office. These conferences occur frequently.**

# County, Without Aid, Paves 100 New Miles

*(Continued from preceding page)*

there has always been enough surveying to be done for a small party in each district.

Flexibility is the motto and keynote. In order to make location easier, the county was split up in mile-square grid coordinates, calling the lower left-hand corner of the map Mile 1. It simplified locations greatly.

The contractors began to like this type of administration, too. Bidding as low as possible, they were told specifically what the County wanted, given good plans, and told to build the jobs as fast as possible. The Commissioners and the Engineer have made it a policy to work with their contractors. The result has been nothing short of amazing. Contractors operating on unit-bid prices have repeatedly worked Saturday and Sunday, giving their men overtime pay, simply to speed the jobs along.

The County made it a similar point of honor, as well as of good business, to pay its estimates promptly at the end of two-week periods. The contractors liked this arrangement. They came back to make more bids when other jobs were let.

Day and night, weekends and weekdays, not a man in that vast, independent new road program shirked his job. Dump trucks raced to and fro between the two new hot and smoking asphalt plants, one in Oklahoma City, the other farther north in the county. The acrid, bitter smell of hot-mix paving drifted through clumps of white oak and pecan trees, as dump trucks discharged their batches to the waiting hoppers of Barber-Greene finishers. Black ribbons began to appear against the red ground on the hills, and heavy steel-wheel rollers mashed and ironed the black cake to silky smoothness under the shade of green trees.

There were times when the clouds turned loose in torrents, and then of course work had to stop. But the sandy red soil, laden with enough clay binder to make it pack, shed its moisture promptly, and work resumed the minute the ground was ready.

The system grew. People began to notice. Inhabitants of Oklahoma County, out of the area on vacation, noticed the change when they came back. There have been words of praise. There have been envious questions of "When will you get around to my place?"

Here again, some of that smart reasoning: they won't get around to Joe's farm until the traffic count is up far enough to merit it. Patronage, pressure, and politics have had no part in this program. The traffic count is *it*. The higher the count, the higher the high-

*(Continued on next page)*

*C. & E. M. Photo*

**Dump trucks discharge hot-mix paving to a Barber-Greene finisher on a paving contract which Oklahoma County awarded to the R. R. Ryan Co. of Oklahoma City.**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**HITCH YOUR GANG MOWER TO THE Worthington "CHIEF"**

Hitching a gang mower combination to Worthington's fast "Chief" tractor really puts your mowing operations in high gear. This rugged, powerful tractor is specifically engineered to team up with gang mower units for fast, economical work. Four forward speeds ranging from 7.5 m.p.h. in low to 47.5 m.p.h. in high gear give it a complete speed range for every working condition.

The "Chief's" low center of gravity and excellent balance throughout make it ideal for pulling mowing equipment over steep banks and hillsides. Extreme flexibility of oscillating front axle assures firm ground contact of both front and rear wheels and mowing unit on even the most severe undulating turf.

When not busy on grass-cutting duty, the "Chief" can be put to work on a wide variety of hauling jobs. Its radiator-protecting front bumper may be used for pushing or implement attachment. Get the full "Chief" story from your Worthington dealer or write for descriptive literature.

● *Note how this pivotally-mounted front axle keeps the "Chief" on an even "keel." For level ground operation, such as at airfields, sports stadia, etc., the "Chief" is available with an automotive spring-mounted front axle. Staunchly built of the finest materials throughout, this quality tractor is powered by a 100 hp. Chrysler industrial engine.*

● *Top: For efficient large area mowing maintenance, this combination of Worthington's famous Grass Blitzer mower and "Chief" tractor is tops.*

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**STROUDSBURG, PENNSYLVANIA**
**Subsidiary of JACOBSEN MANUFACTURING COMPANY, Racine, Wisconsin**

*C. & E. M. Photo*
**Oklahoma County Engineer C. W. McFerron wades through the multitudinous maps and papers screaming "urgent" on his desk, but manages always to keep relaxed and smiling.**

# County, Without Aid, Paves 100 New Miles

*(Continued from preceding page)*

way priority. Since the completion of some of the new roads, counts have almost doubled, an indication of their popularity.

There are details in this construction story, but they are not unusual. The usual hauling trucks; Barber-Greene finishers; Buffalo-Springfield smooth rollers; men working one and two shifts a day. But the details are not the story. The story is the enthusiasm which energetic public-spirited citizens were able to generate when, with the courage of their convictions, they teamed up to get things done, under competitive bidding.

There are white hairs in the heads of some of these men. But there will be long lived black pavements in Oklahoma County for many years after these men leave construction, planning, and contracting.

### New Bridge on Program

Included in the new construction program is a $210,000 steel and concrete bridge 720 feet long across the North Canadian River. Here again the letting of materials contracts has greatly lowered the contract price of the bridge. The new structure, when finished, will be a new link between the southern and northern parts of the county. Work is in progress, temporarily curtailed because of flood stage on the North Canadian.

The new bridge will have 12 steel H-pile bents 60 feet wide, with concrete skirts and caps, steel girders, and a reinforced-concrete deck. The skewed piers are now all in, and concrete and steel work is at present in progress on the deck.

### Maintenance Stepped Up

Naturally the new accent on construction has put maintenance in an even more important light than ever before. With all the new paved mileage, maintenance of the other pavements will certainly have to be stepped up. And the grading and blading of earth and gravel county roads is being accelerated to compare as favorably as possible with the modern new roads.

Up to now a routine $425,000-a-year budget has been expended largely on maintenance. This amount is derived from the county share of gasoline and registration tax, and from a share of the millage levy on real property, as allocated to highway improvement.

Oklahoma County is divided into three maintenance and construction districts, each with its own commissioner, each with its own foreman of maintenance, and each foreman with a crew of approximately 50 men. There is a nice working arrangement which is participated in by all three commissioners, all three foremen, and the County Engineer. While the authority has been decentralized to the districts, the thinking is still county-wide and the maintenance program operates on that principle.

Intelligent flexibility marks maintenance as it does construction. Each district has a mower, for instance, but for additional work another is hired from a farmer. If a tractor breaks down and needs extensive welding beyond the shop capacity, it is hauled down to Oklahoma City to one of the big tractor distributors, repairs are made, and the County invoiced.

"We don't aim to overload ourselves on shop equipment and man-power," McFerron explained. "You can go just so far with that until you operate to the detriment of the roads."

"Mr. Mac", as McFerron is known, also comes in for his share of work in connection with the maintenance program. The kicks of property owners come usually to the commissioners, but problems of how to get mainte-

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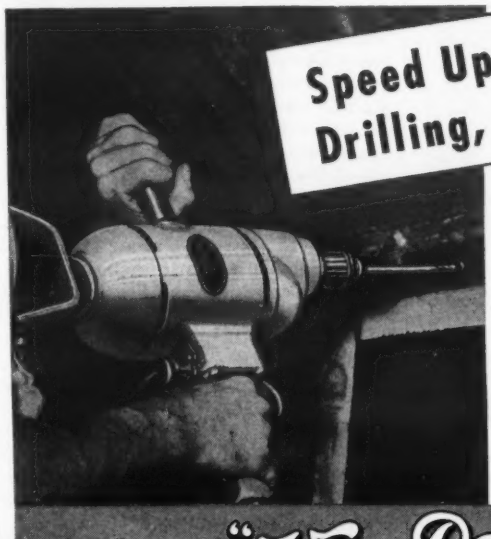

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Short order service is a specialty of BAY CITY Cranes. That's why a Model 65, 20-ton BAY CITY Crane owned by American River Sand and Gravel Co. was used to erect steel on this new Campbell Soups plant at Sacramento, Calif. Equipped with 60 ft. boom plus adjustable jib, this BAY CITY hoisted beams and girders swiftly and safely—spotted them accurately for fast, economical construction. For full particulars on BAY CITY Cranes and CraneMobiles in double-short order, see your nearest BAY CITY dealer or write direct to BAY CITY SHOVELS, INC., Bay City, Michigan.

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SEE YOUR NEAREST DEALER for Bay City excavating and material handling equipment in sizes from ⅜ to 1¼ yards having crane rating up to 20 tons. Both crawler and pneumatic tire mounting.

## County, Without Aid, Paves 100 New Miles

*(Continued from preceding page)*

nance done are often referred to McFerron. Gravel roads are graded by pulled blades and motor graders after the rains, and usually at weekly intervals in dry summer months. Ditches are pulled in the spring to open them up, in the autumn to remove weed growth. The County is also doing a great deal of grass development on its road shoulders.

Operating about 100 pieces of equipment, including 16 tractors, 17 various motor graders, 20 pulled graders, and 30 dump trucks with 3 power loaders, the maintenance program is steady. Many of the machines are quite old, and repairs are a problem. Major repairs always come in to the County's main 80 x 100-foot shop, a corrugated-metal building about 8 miles east of the city, where four service men and two blacksmiths operating under the direction of Mechanical Foreman L. K. Dixon do the repairing.

Dixon is a wiry, tough individual who entered Oklahoma in 1889, a big year in the annals of that young state. He is a man with mechanical feel, technical training, and a most practical approach to his daily problems.

Asked how the equipment operators generally reported major or minor breakdowns to his attention, so he would know where they were, he grinned and said, "Son, did you ever see how a houn' dawg acts when a fast train goes by? Well, them operators do the same thing when any little thing goes wrong. They just set an' howl!"

Dixon's shop is a modest layout, but capable of making major overhauls when parts are available. Any big jobs beyond its mechanical capabilities are, of course, sent in to Oklahoma City. These would include any elaborate welding and machine-lathe work that might be required.

The shop is equipped with the following machines:

1 Sioux valve refacer
1 Sioux bench grinder
1 Raybestos brake machine
1 Dake 70-pound press
2 Yale spur-geared hoists
1 Steam cleaner
1 Wyco portable grinder
1 Hobart welder
1 Southwest compressor

The blacksmith shop is just as modestly equipped, but is busy each day with a variety of metalwork.

### County Sets Example

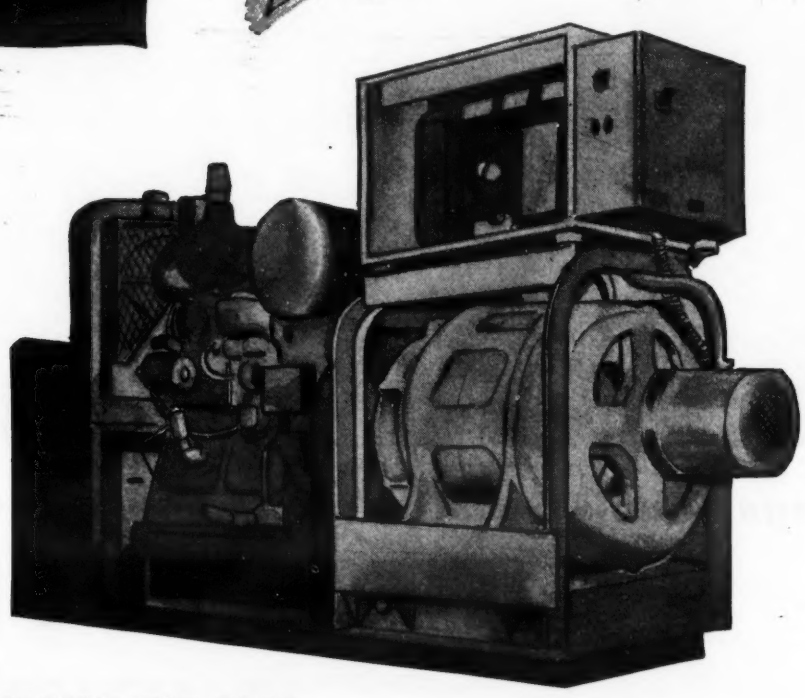
All in all, the effort and organization of Oklahoma County, especially during the fast but low-cost construction work of the past year, is a record that stands for itself. Some people said modern paved roads in Oklahoma County were impossible to build for $30,000 a mile. Oklahoma County is building 154 of those miles, with a new $210,000 bridge thrown in for good measure. Figure it out for yourself.

Every penny has been put on the roads for the people to use.

*U. S. Savings Bonds are a good Investment. Buy them regularly.*


ELECTRIC GENERATOR SETS

25KVA



*now offered on*

**COMPETITIVE SEALED BID SALE**

These are single-phase, 60 cycle, 120 volt, 900 R.P.M. generator sets. Power-full, long-lived, these units are ideal as stand-by power wherever continuity of power is a necessity. They are gasoline engine driven but are readily adaptable to operation on natural gas.

Here are the power plants for service in construction camps—gas and oil drilling units—mining locations—logging camps—and as stand-by units in industry.

The inventory is located in Baltimore where arrangements may be made for inspection. For full information concerning this sale and complete data on available generators, write to the Baltimore or Richmond Regional Offices, or visit your nearest Customer Service Center.

**BASE MOUNTED AND TRAILER MOUNTED**

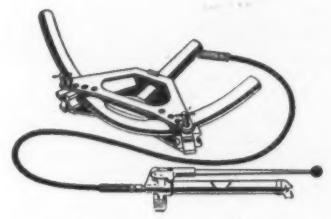
***EXPORTERS:***

Your business is solicited. Much material which is surplus in the United States is urgently needed or is readily salable in other countries. Watch for other offerings; many of them may be of interest to your clients.

OFFICE OF GENERAL DISPOSAL
WAR ASSETS ADMINISTRATION
GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago Cincinnati • Cleveland • Denver • Detroit • Grand Prairie, Tex. • Helena • Houston Jacksonville • Kansas City, Mo. • Little Rock, • Los Angeles • Louisville • Minneapolis Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa 1243





**When you buy a**

**BENDER**

***...check to make sure you get these features:***

**EASY TO GET TO THE JOB**

☑ Lightweight, portable—one man can easily take a Blackhawk Pipe Bender right to the job. Bends rigid conduit and pipe in all popular sizes, up to 4" diameter.

**WORKS AT ALL ANGLES**

☑ The compact hydraulic Porto-Power Ram is all-directional. Power eliminates need for heating the pipe.

**WORK OVERHEAD**

☑ All-directional operation and light weight enlarges range of utility to use on ladders, scaffolds and cramped quarters and work on existing pipe runs.

**SIGHT FROM ANY ANGLE**

☑ Remote control permits operator to stand in any position for a full view of the job. Saves need for elbows, couplings, cutting and extra threading.

**DETACHABLE POWER UNIT FOR EXTRA UTILITY**

☑ It pulls gears, lifts machinery, and licks scores of other trouble jobs.

**BLACKHAWK Porto-Power PIPE BENDERS**

BLACKHAWK MFG. CO.
Dept. P-1877, Milwaukee 1, Wis
Mail Hydraulic Equipment catalog to

NAME _____

COMPANY _____

ADDRESS _____

Two types of Jiffy adapters with points in place are shown at top of photo; below, a standard Jiffy reversible point.

## Points for Trenchers

Self-sharpening reversible points for trenchers, rooters, buckets, and similar digging equipment are obtainable from Jiffy Products Co. of Texas, 4325 Elm St., Dallas, Texas. The manufacturer claims that the points, made of high-carbon steel, can be reversed three or more times, and that they will sharpen themselves as they work.

Adapters and buckets are also made to fit all types of ditching machines. Both are designed so that only one style of point is needed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.

## Cast-Iron Soldering

A soldering rod for repairing cracks in cast iron which must be water-tight and pressure-tight against pressures up to 1,000 psi is made by the All-State Welding Alloys Co., Inc., 96 W. Post Road, White Plains, N. Y. It can also be used for sealing and filling cracks and blowholes, and for building up where strength is not required.

Some uses suggested by its manufacturer are: building up broken corners and low spots in motor blocks and cylinder heads; soldering cracked heads on engines; and tinning the bottom outlet of a car radiator in preparation for soft-soldering it to the copper bottom of the radiator.

Melting point of the rod is 600 degrees F, and it is said to tin easily and rapidly. The All-State No. 7 cast-iron rod is designed to be used with All-State No. 7 flux, except for brazing dissimilar metals to aluminum, where All-State No. 53 flux should be used.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 21.

## New Hydraulic Jack

A hydraulic jack of heat-treated aluminum and steel, weighing about 65 pounds, is made by Lee Engineering Co., Pawtucket, R. I. The manufacturer states that the Auto-Lift jack can be lowered as slowly or as fast as desired and can be stopped at any point on the way down.

This action is controlled by the telescopic handle which is adjustable in length and can be removed from the base if desired. Lifting range of the jack is from 4½ to 22 inches. The hydraulic cylinder is said to be quick-acting and has a 3,000-pound capacity. Wheels are steel, 3 inches in diameter and 1¼ inches wide. The chassis is 24 inches long.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 44.

## Pipe-Joint Compound

A pipe-joint compound for use with concrete and vitreous pipe is described in Data Booklet No. 2A of the Thompson Materials Corp., 204 West St., New York, N. Y. The TMC compound is a blend of special asphalt, a non-volatile bituminous binder, solvents, and a special inorganic filler. It is workable with a trowel and is of a putty-like consistency. The manufacturer states that it will not harden or crack in temperature ranges.

The booklet lists some of the outstanding characteristics of the compound, its method of application, and specifications. The last page contains a table showing the pounds of compound needed with various sizes of pipe and depths of socket.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 54.

## Staff Changes for Rogers

Changes in its executive staff have been made by the Rogers Brothers Corp., Albion, Pa., maker of heavy-duty equipment trailers. Harrison J. Rogers has been elected Vice President and General Manager. He will also continue as Sales Manager.

**Scoop it up Fast • • • • !**

The ½-yd. scoop handles any loose material quickly, economically. Loads into railroad cars or carrying trucks, etc. TRUK-LODER attaches to any standard dump truck whose hoist furnishes lifting power.

*Write for more information*

**TRUK-LODER CO.** TIFFIN, OHIO

***says* Combs Construction Company, Chattanooga,**

***about* MICHIGAN**

This MICHIGAN owner, in a letter to Nixon Machinery & Supply Co., Chattanooga, goes on to say

". . . we have never gone wrong buying equipment that you recommend. Your claims were, if anything, conservative.

"We have used our MICHIGAN as shovel, back hoe, clam, dragline and in steel erection as a crane. In all operations it has proven a very efficient and economical machine. Operating and maintenance costs have been extremely low. Its mobility and flexibility, plus its other features has convinced us that it is an essential part of our equipment fleet.

"We recommend the MICHIGAN Model T-6-K, without reservations, for any work within its capacity."

Full details about the complete line of ⅜ yd. and ½ yd. convertible MICHIGAN Mobile SHOVEL-CRANES are available on request.

**MICHIGAN**
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

# Sand-Clay Base Laid For Secondary Road

## Material Is Well Mixed, Then Primed With Tar and Given Double Bituminous Surface Treatment

+ MANY secondary or farm-to-market roads are being constructed in South Carolina in a widely distributed program to provide such improvements where they are most needed. A typical project of this nature, FAS project No. S191(1), has been under way for 6.2 miles on State Route 156 in Lee County, in the northeast section of the state. The improvement began at the intersection of U. S. 15 and extended north to the intersection with State Route 153. The closest large town was Bishopville on U. S. 15, about 3 miles from the beginning of the job.

These low-cost projects are made possible by taking advantage of local materials in nearly all cases. This particular job was built by the Boyle Construction Co. of Sumter, S. C., for a total cost of $110,067.31. This included house moving to clear the right-of-way, grading, placing a sand-clay base over a 21-foot width, and adding a bituminous pavement of inverted-penetration-type surfacing with seal.

Work on the 45,000 cubic yards of excavation for the grading began last October, following fairly closely the alignment of the existing 16-foot dirt road. This old section was widened to a 28-foot roadbed. The sharp dips in the old vertical profile were lessened considerably by making cuts as deep as 5 feet and moving the material to make fills averaging 2 feet high.

For the long hauls averaging 2,000 to 3,000 feet, three 16-yard Super C Tournapulls were used. On the short hauls, up to 600 feet, tractor-scraper units were employed. These consisted of a Gar Wood 16-yard scraper pulled by a Caterpillar D8 tractor, and a LeTourneau 8-yard scraper pulled by a Caterpillar D7 tractor. The smaller unit did the finishing work. Afterwards two Caterpillar No. 12 motor graders with 12-foot blades shaped the subgrade to true grade within ½-inch tolerance, leaving the required 2½-inch parabolic crown. This phase of the job was completed by December 15.

Before work could begin on the base course, however, the shoulders first had to be constructed, since they were to serve as a form in which the sand-clay base was laid. Selected material was used for the shoulders. It consisted of the top 6 inches of soil where Bermuda grass was growing in the fields. It was deposited 8 inches thick on the shoulders of the roadway. These shoulders are 3½ feet wide and were left 21 feet apart, the width of the base course. Most of the shoulder construction was done with the smaller scraper and the motor graders.

### Sand-Clay Base

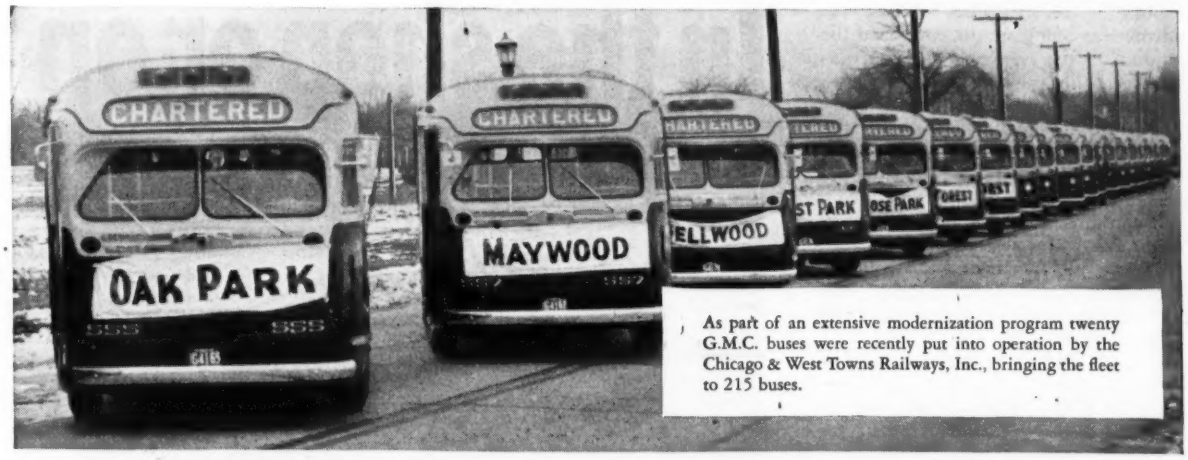
Hauling the material for the sand-clay base course began about the middle of December and was completed by the end of January. Two suitable pits were opened. One was about 700 feet and the other a mile off the road, measured from two points each of which was about 1½ miles from the opposite ends of the project. A Lima dragline with a 35-foot boom and a Hendrix ¾-yard bucket made cuts from 4 to 15 feet deep, loading to 15 International trucks which hauled from 7½ to 8 yards to the load. When the pit work was finished, the borrow areas were leveled off and smoothed over by an International TD-18 tractor-dozer.

The trucks dumped the sand-clay material in piles down one half of the road, forming a continuous windrow 3 to 4 feet high. This material was then knocked down by the TD-18 dozer. Two No. 12 motor graders followed to move the sand-clay across the full width of the road between the shoulders. Enough material was dumped to make a loose course 11½ inches deep which would compact under rolling to

(*Continued on next page*)

*C. & E. M. Photos*

**A Killefer disk harrow (see above), pulled by a Caterpillar D7 tractor, pulverizes sand-clay base material on the 6.2-mile job in Lee County, South Carolina. It is followed (see right) by a Ferguson dual plow pulled by a Fordson tractor. Boyle Construction Co., of Sumter, S. C., continued these mixing operations in sequence until all the base material was uniform.**




As part of an extensive modernization program twenty G.M.C. buses were recently put into operation by the Chicago & West Towns Railways, Inc., bringing the fleet to 215 buses.


**Low maintenance and reliable operation...**

***keep Chicago & West Towns Railways sold on . . .***

**Stanolube HD**

Mr. Bert Collett, President of the Chicago & West Towns Railways, Inc.—which operated over seven million vehicle miles last year—has had ample opportunity to judge the cost-reducing quality of Stanolube HD.

Long mileage records between overhauls as secured by Mr. Collett are reported by practically all users of Stanolube HD. This heavy-duty, heat-resistant oil is fortified against oil oxidation and the formation of deposits. A Standard Oil Automotive Engineer can give you all the facts and help you make a test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

Attending the ceremony inaugurating the addition to the fleet were: (from left to right—front row) J. L. Phelps, Standard Oil Automotive Engineer and D. E. Sterling, Asst. Superintendent of Equipment of the C. & W. T. Rys. (Rear row) B. J. Toale, Standard Oil Automotive Engineer; Leslie E. Salter of the Illinois Commerce Commission; H. C. Soenksen, Standard Oil Salesman; P. W. Gerhardt, Asst. to President of C. & W. T. Rys.; L. P. Reilly, Superintendent of Equipment; Mr. Collett, President of C. & W. T. Rys.; B. L. Goldberg, Counsel for C. & W. T. Rys. and J. W. Van Cleave, Standard Oil Automotive Engineer. Mr. Reilly, with the assistance of Mr. Sterling, is to a great extent responsible for the excellent maintenance record of this fleet.

CHICAGO & WEST TOWNS RAILWAYS, INC.
GENERAL OFFICES
LAKE STREET AND CUYLER AVENUE
OAK PARK, ILLINOIS

Standard Oil Company
Chicago, Illinois

April 29, 1947

Gentlemen:

Since the first buses were put into operation on our suburban service we have recognized the vital importance of good fuels and lubricants. They not only contribute to low maintenance, but they insure reliable operation which is our first consideration.

We have found Standard Oil's fleet products completely satisfactory, particularly Stanolube HD motor oil which we have used for the past seven years.

With this oil many of our engines have operated 200,000 miles without a major overhaul. With the exception of the oldest buses in the fleet, the average mileage between valve grinding and reringing is well over 100,000 miles. We attribute this highly satisfactory performance to good maintenance practice and Stanolube HD -- the best oil we have used during our twelve years of bus operation.

Bert Collett
PRESIDENT

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

STERLING LIGHT PLANTS
THE CHOICE OF LEADING CONTRACTORS
SIMPLE—DEPENDABLE—RUGGED
WRITE FOR LITERATURE
STERLING MACHINERY CORPORATION
405 Southwest Blvd., Kansas City

*C. & E. M. Photo*
**Pulled by an International I-9 rubber-tired tractor, a Bros rubber-tire roller with 6 front and 7 rear wheels compacts sand-clay base on the Boyle Construction Co. job.**

# Sand-Clay Base Laid For Secondary Road

*(Continued from preceding page)*

give a firm, solid 8-inch layer.

Local traffic was maintained during the building of the base. While the windrow was being set up, cars used the other half of the road. While the material was being pushed across the road and before the mixing and rolling were finished, traffic traveled by on the shoulders.

This part of the job was done in the winter. Therefore the base material, which contains about 11 per cent clay, held enough water so that more did not have to be added during the mixing. This mixing was done to disperse the clay evenly throughout the greater percentage of sand in the soil; it was continued until all the material was of a uniform color and appearance and also texture. All the lumps of soil had to be reduced to the same consistency.

Mixing was a long, continuous process. It began with a Caterpillar D7 tractor pulling a Killefer disk harrow up and down the road until all the material was thoroughly pulverized. The disks on the harrow were 30 inches in diameter; the 12 front ones threw the material in one direction, and the 13 rear disks threw it in the opposite direction.

After the harrowing, a Fordson rubber-tired tractor pulled a Ferguson dual plow along to cut twin furrows in the base course 28 inches apart. At each turn the plow lapped one of its furrows on the return trip. The deep furrows were then leveled off again by the harrows as they continued their pulverizing swath, while the plows cut the base up again in their wake. These operations continued in sequence until from 10 to 50 passes had been made, depending on the amount of mixing required to make the soil uniform and homogeneous.

Then the two motor graders took over and put a crown in the base course by blading from the edges towards the center. They were followed by a Bros pneumatic-tire roller pulled by an International I-9 rubber-tired tractor. When the 11½ inches of loose material had been compacted to a solid 8 inches of base course, a Caterpillar road maintainer with 8 blades was pulled over the surface by the I-9 tractor. This smoothed off any uneven places and was followed by more pneumatic-tire rolling.

### Surface Treatment

In South Carolina the season for bituminous surface treatments runs from April 1 to October 15 with the temperature required to be 55 degrees F or above. Consequently the base course was kept to true line and grade from the end of January until the time and temperature permitted paving operations in April. The road maintainer and pneumatic roller were used at regular intervals to see that the sand-clay was held firmly in shape.

When it was time for the surface treatment, a power broom and blower first went over the base course removing all loose material and dust. Then a prime coat of RT-2 tar was applied at the rate of 0.3 gallon to the square yard by an Etnyre 1,420-gallon distributor. It hauled the material an average distance of 30 miles from Sumter. The road was closed to traffic during the priming which was left to cure until dry. Then an application of 85 to 100-penetration asphalt was sprayed on at the rate of 0.4 gallon to the square yard.

This was covered with 1½-inch mat stone dumped through spreader boxes at about 47 to 50 pounds to the square yard. On top of this went an application of cut-back asphalt at the rate of 0.21 gallon to the square yard. This was sealed with ½-inch stone, 22 to 24 pounds to the square yard. The seal course was thoroughly rolled and, when it had dried, another application of cut-back asphalt was made at the rate of 0.21 gallon per square yard. Rolling was done by a 10-ton 3-wheel roller. The road was then opened to traffic.

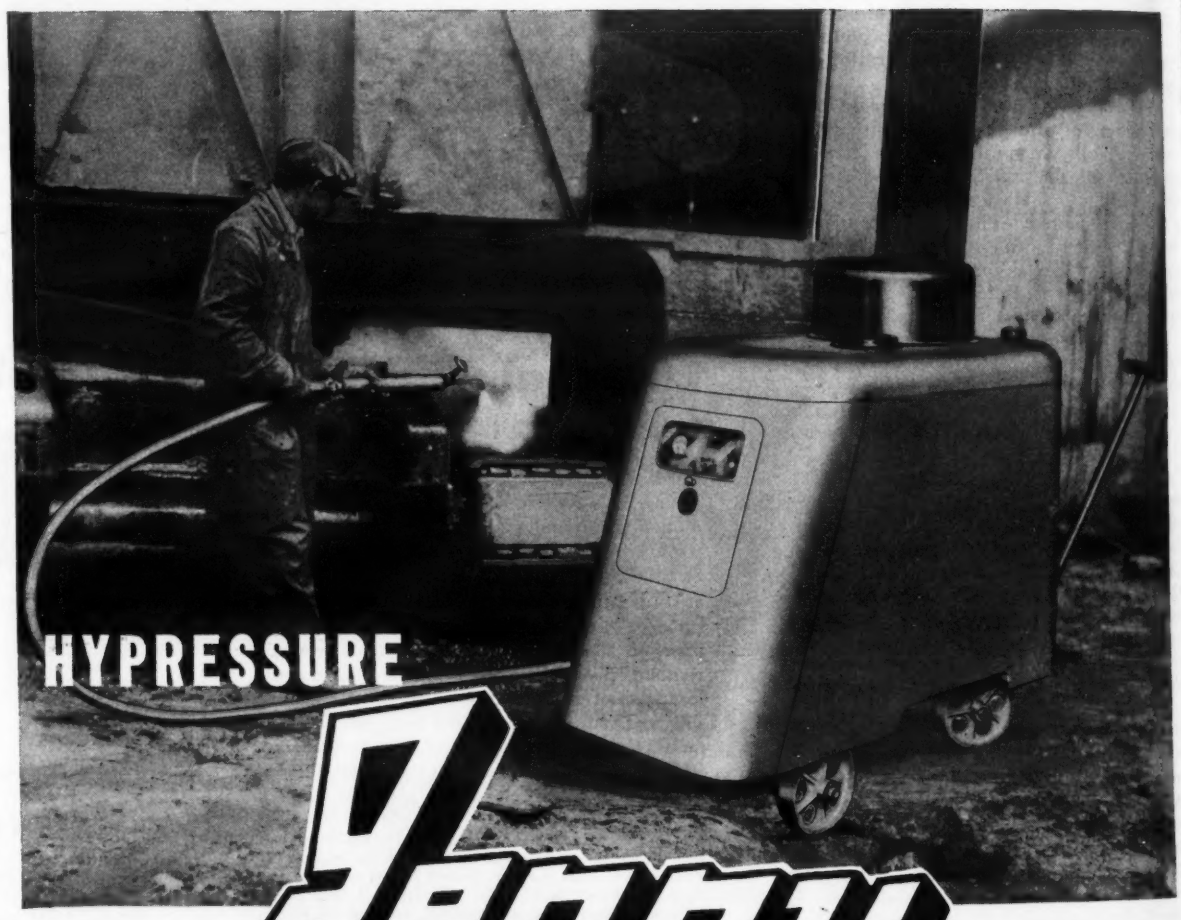
*(Concluded on next page, Col. 2)*

*C. & E. M. Photo*
**On the secondary-road improvement in South Carolina, a Caterpillar No. 11 diesel-power grader shapes the sand-clay base in preparation for a road maintainer which will follow.**

Complete line of
gasoline, pneumatic and electric driven
concrete vibrators and grinders
*Write for information and prices*
**ROETH VIBRATOR COMPANY**
1737 Farragut Ave. Chicago, Ill.



# In the shop or on the job...




**Saves Time . . Labor . . Money**

With Hypressure Jenny you can clean—right on the job—heavy-duty field equipment fouled with mud, muck and grease, thus promoting faster, more efficient operation. You can put machinery, shopped for repairs, back on the job 40% quicker if you Hypressure Jenny steam clean it before your mechanics start working on it. Compact, portable, efficient Hypressure Jenny is ready to work instantly—on the job or in the shop—in less than one minute after pressing the starting switch. Cleaning is accomplished by a highly atomized mixture of steam, hot water and cleaning compound applied under pressure through a spray gun. Hypressure Jenny cleans thoroughly and fast—10 times faster than by hand methods . . . is safe, simple, easy to operate.

Why not write us for complete information on this amazing time and money saving steam cleaning machine. There is no obligation.

**HYPRESSURE JENNY DIVISION**
**HOMESTEAD VALVE MANUFACTURING CO.**
P.O. BOX 30 CORAOPOLIS, PA.

The new Oliver tractor-dozer unit is small and light enough to work in close quarters and on soft ground. The Impdozer is hydraulically operated.

## Small Tractor-Dozer

A small tractor and dozer combination which can work in close quarters and in soft terrain has been announced by the Oliver Corp., 400 W. Madison St., Chicago 6, Ill. The specially made dozer, called the Imp, is front-mounted and hydraulically operated. It develops 4 hp per foot of blade length. The unit is applicable to general clean-up work and roadside-development operations, its manufacturer says.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.

## Welding-Tip Cleaners

Wypo tip cleaners, for use in cleaning oxyacetylene welding and cutting tips, have been added to its line of apparatus by Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

They are made of corrosion-resistant stainless steel, and are available in two sets: Set No. 1 contains 12 cleaners for drill sizes ranging from No. 75 to No. 49; Set No. 2 contains 9 cleaners for drill sizes ranging from No. 48 to No. 30. Each set comes in a compact easy-to-carry case.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 12.

## Clamping, Splicing Tools

Literature describing its Clamp-Master kit is available from the Punch-Lok Co., 321 No. Justin St., Chicago 7, Ill. This kit provides materials and equipment for clamping, splicing, tying, mending, and banding. Included in it are a Clamp-Master tool for tensioning and locking clamps, 31 flat-strip steel clamps of assorted sizes, and 14 open-end clamps for use where the ends of the object to be clamped are obstructed.

Form No. 240 describes the kit, the way to use the Clamp-Master, and sizes available. Form No. 235 also describes several uses for Clamp-Master tools, as in repairing splits or breaks in pipes, posts, shovel handles, and similar objects; and for clamping hose and other materials.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 68.

## Ford Personnel Changes

C. J. Fournier has been named Manager of the parts and service department for the southwestern region by Ford Motor Co., Dearborn, Mich. He will make his headquarters at the office for that region in Kansas City, Mo. Mr. Fournier has been Supervisor of the service section of the parts and service department in the central office for the past two years.

J. J. O'Neill has been named Assistant Manager of the fleet sales section of the truck and fleet sales department.

J. C. (Larry) Doyle has been named Central Regional Manager. Mr. Doyle, Manager of the company's Dearborn District since October, 1945, succeeds A. B. Pease who is being transferred to the central office in Dearborn to head a newly created parts and service division.

## Sand-Clay Base Laid For Secondary Road

*(Continued from preceding page)*

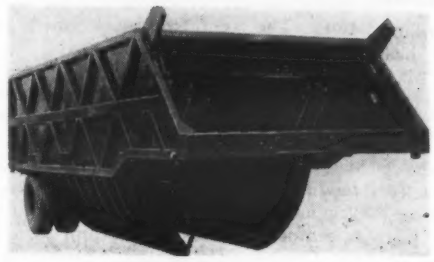
### Quantities and Personnel

The major items in this 6.2-mile secondary-road contract included:

| | |
|---|---|
| Excavation | 45,000 cu. yds. |
| Sand-clay base course | 24,000 cu. yds. |
| Tar prime | 24,000 gals. |
| Asphalt seal | 66,000 gals. |
| Crushed stone for mat and seal | 2,900 tons |

For the Boyle Construction Co., J. S. Wood was Superintendent and J. S. Dowd was Foreman. For the South Carolina State Highway Department, C. W. Milling was Resident Engineer in charge of the project. The Northeastern District in which it was located is headed by H. L. Sligh, District Engineer with headquarters at Florence. J. S. Williamson is Chief Highway Commissioner of the Department, and C. R. McMillan is State Highway Engineer.

*Proper lubrication at regular intervals is essential to maintain the operating efficiency of your equipment. Choose your lubricants carefully; use them wisely. It pays.*

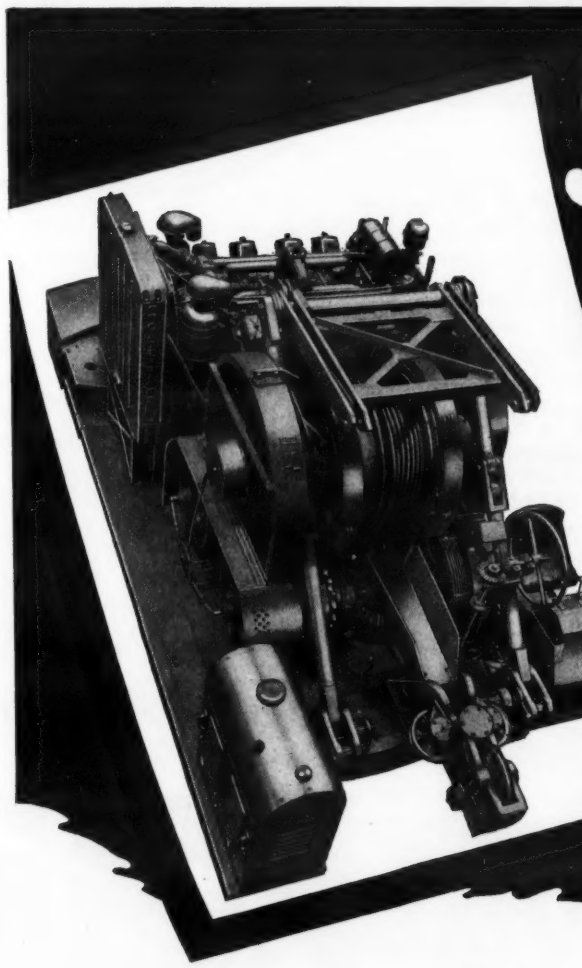
*A New*
**BOTTOM DUMP TRAILER**

**On and Off Hi-Way**
**15 to 50 Tons**
**Positive Dump and Windrow Control**
★

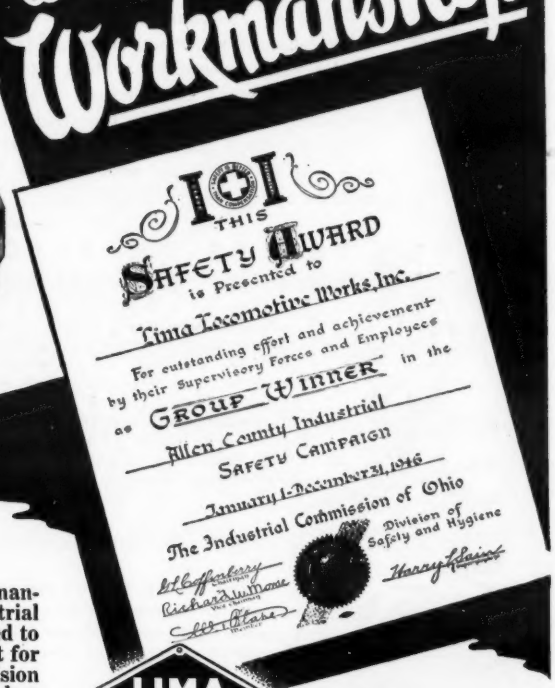
Here's a unit contractors have been asking for, a bottom dump trailer that provides LARGE CAPACITY with little dead weight, positive door control from truck cab, and truck-powered hi-way speed! 60-day delivery. Write for details.

*Our 37th Year Serving the West*

**OLSON** *Manufacturing Company*
★ ★ ★ ★ BOISE, IDAHO ★ ★ ★ ★



*Safety goes hand in hand with Quality Workmanship*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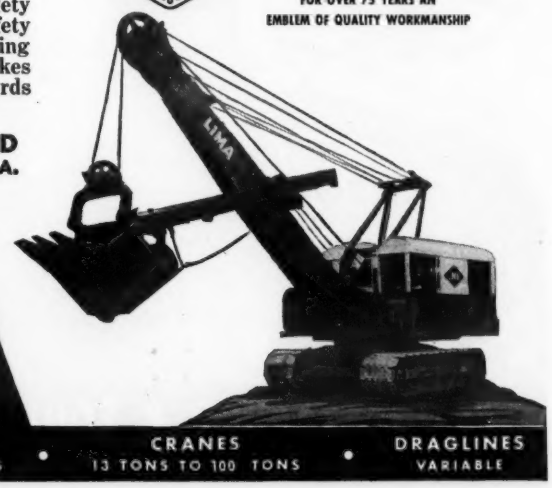
THIS
SAFETY AWARD
is Presented to
Lima Locomotive Works, Inc.
For outstanding effort and achievement by their Supervisory Forces and Employees as GROUP WINNER in the
Allen County Industrial
SAFETY CAMPAIGN
January 1-December 31, 1946
The Industrial Commission of Ohio
Division of Safety and Hygiene

**Safe working conditions go hand in hand with quality workmanship. This claim was recently substantiated when the Industrial Commission of Ohio, Division of Safety and Hygiene, awarded to Lima Locomotive Works, Incorporated, a certificate of merit for having the best safety record in the heavy industries division for 1946. In design and manufacture, LIMA has always taken every precaution to safeguard the men who work around LIMA machines. For instance, all exposed gears are protected by safety guards; platforms around the operator's position have safety treads; points of lubrication are centralized to eliminate oiling dangers and the compact arrangement of the machinery makes every part easily accessible. Be safe with a LIMA. Records prove that a safe machine produces greater output.**

**LIMA LOCOMOTIVE WORKS, INCORPORATED**
**Shovel and Crane Division** **LIMA, OHIO, U.S.A.**
OFFICES IN PRINCIPAL CITIES

LIMA

THE LIMA DIAMOND FOR OVER 75 YEARS AN EMBLEM OF QUALITY WORKMANSHIP




**LIMA**

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## Bituminous Mix Plant Has One-Man Control

A portable bituminous mixing plant which features one-man control has been announced by Overmander Machine, Inc., 501 Lincoln Blvd., Marion, Ind. Once it is set for feeder adjustments, the manufacturer says, full control of the Monotrol plant is obtained from a central control board. Capacity of the Model RW-1 is 20 tons per hour. Production of the 40-ton model has been suspended due to shortages of materials.

Overmander-designed gravity-type or rotary variable-speed-type driers are available. The rotary type controls the flow of aggregate so that the moisture is removed while production capacity is maintained. The aggregate is broken up and mechanically passed through the heat; its rate of travel is controlled as necessary to compensate for variation in moisture content.

Hauck burners are employed on all Overmander mixing plants. It is claimed that the burners adjust to obtain maximum Btu's from the fuel. A Victor-Acme blower produces air for operation. The combustion chamber is lined with heavy refractory blocks.

A volumetric feeder designed by Overmander is mounted at the bottom of the three-compartment bin. It is equipped with valves and controls designed to minimize guesswork in the feeding of aggregates. The flow of aggregates is visible at all times to the operator. The asphalt pump also has an Overmander-design control; it is said to produce the exact gallons desired regardless of temperature changes in the asphalt.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 22.

## Truck Line Has 100 Styles

A folder showing its complete line of trucks has been put out by the Ford Motor Co., Dearborn, Mich. Made in the style of a folding postcard, it shows all Ford models from light-duty pickups to the largest trucks the company makes. The line consists of over 100 standard factory-built chassis and body combinations; the trucks are available in seven wheelbases.

The folder contains pictures of the two Ford engines: the 100-hp V-8 and the 90-hp six. Other features illustrated or mentioned in the folder are the heavy-duty clutch and transmission, the two-stage springs, two-speed axle, hydraulic brakes, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 17.


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# Avoid Legal Pitfalls

**Edited by A. L. H. STREET, Attorney-at-Law**

*These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.*

## Bid Neither Reduced Nor Revoked

Fundamental legal principles which govern the formation of contracts were given an interesting and important application in a case lately decided by the United States Court of Claims. Plaintiff contractors mailed a $693,000 bid to a housing authority. They did so under bidding instructions which permitted telegraphic modification if the message was received by the Authority before the hour set for opening the bids.

But plaintiff contractors received late offers from subcontractors. And these justified reducing the bid by $50,000. So plaintiffs telegraphed the Authority to reduce the original bid by that amount. Despite earnest efforts by plaintiffs to get the telegram delivered before the bids were opened, it was not received until after the opening, which disclosed that plaintiffs' original bid—before any reduction—was lowest by the amount of $4,000.

Learning that fact, plaintiffs had their representative notify the Authority to disregard the telegram. And they fortified the request by sending a telegram to the Authority after the bids had been opened. Despite all this, the Authority awarded the work to plaintiffs for the price of $643,000 and a contract was entered into. However, it reserved the contractors' right to litigate their claim that the true contract price should be $693,000, as originally bid.

### No Actual Reduction of Bid

The Court of Claims decided that there was no reduction in the amount of plaintiffs' original bid. It declared: "They dispatched a telegram intended to make" a reduced bid "but when they learned that the telegram had been delayed and that their written bid of $693,000 was low, they formed the intention to withdraw the offer contained in the telegram, and communicated that intention to the intended offeree, the Authority, before their offer reached it. *An offer is not made until it is communicated to the offeree, and until it is made it may be withdrawn, or obliterated, by a communication expressing an intention to do so.* If the willingness to contract on the basis of words previously dispatched no longer exists, and if the absence of that willingness has been brought home to the person to whom the words were dispatched, the words when they later arrive, are empty of the substance necessary to the meeting of the minds of parties in a contract. . . . There was, therefore, no offer to reduce the bid, made either on time or late, which the Authority could accept, either under the particular procedures by which Government contracts are made, or under ordinary contract law."

Certain contentions were made on behalf of the Government under contract provisions which had to do with the revocation of bids before acceptance. But the Court of Claims refused to consider their merits. It reiterated that this was not a case of bid revocation, because the telegram offering to reduce the original bid never became any part of the plaintiffs' original bid. (Miller v. United States, 62 Fed. Supp. 327.)

### What Became of the Contract Price?

But, having decided that the plaintiffs never reduced their original bid, the Court of Claims met another contention of the Government: namely, that the Authority never accepted the original bid; that the contract price was $643,000; and that it would have re-advertised for proposals rather than award the job at $693,000.

The Court replied: "This is speculation. . . . What the Government would have done would have, probably, depended on the trend of prices of labor and materials, and the necessity for early completion of the work, which was a war housing project. Re-advertising would have taken time, which might have been regarded as more valuable than the possibility, by no means a certainty, of saving some money."

The Court of Appeals regarded as "the essence of the case" the effect of a clause in the contract as follows: ". . . Neither the execution of this contract nor any action taken thereunder, nor the recital of the contract sum herein" [$643,000] "shall constitute . . . a waiver by the contractors of any *right . . . to establish . . . the true contract price to* be $693,000. . . . The Government grants the aforesaid right of action to the contractors and shall not interpose the defense of waiver or estoppel."

The contractors insisted that this clause meant the Government was willing to pay $693,000 if the contractors had not made a binding offer to reduce the bid to $643,000. On the other hand, the Government insisted the clause merely meant that the contractors could sue but that the contract price would remain $643,000 no matter how the suit came out. The Court of Appeals said that the clause was *ineptly worded* if it was intended to bear the meaning claimed by the contractors and *completely useless* if it meant what the Government claimed it did.

The court ordered a rehearsing on the question of the mutual intent of the parties in inserting the clause in the contract. After the evidence was taken, it said: "On the basis of that evidence, we have concluded that the parties were in disagreement as to what amount the plaintiffs had effectively bid; that neither party was willing to make an unqualified contract for the amount which the other party contended to be the amount of the bid; that they reached an agreement to qualify the language of the contract so that it would permit the plaintiffs to establish the bid price, which should thus be the contract price, by litigation, in which the disputed facts relating to the telegram could be resolved, and that the correct rules of law could be applied to them.

"We therefore construe the ambiguous special language in the contract . . . as intended to mean that the price should be $643,000, or $693,000 if that sum should be shown by litigation to be the plaintiffs' bid. We have concluded above that the plaintiffs' bid was $693,000. That was, therefore, the price which the Authority promised to pay for the work. It follows that the plaintiffs may recover $50,000."

### Better Wording of Contract Clause

We gather from the court's opinion that the issues in this case would have been considerably simplified had the contract, instead of containing the clause above quoted, read something like this: "Nothing in this contract shall prejudice the contractors' right to establish by litigation, if they can, their contention that they never effectively bid less than $693,000 as the price for the contract work; and it is mutually agreed that, if that contention be so established, the contract price herein provided shall be $693,000 and not $643,000." That would have left nothing to be litigated except the single question whether the contractors ever made a binding bid to do the work involved at the lower figure.

## What Emergency Authority Do Your Foremen Possess?

We wonder how common is the practice of issuing to contractors' foremen, field superintendents, etc., detailed instructions as to the scope of authority they may exercise in emergencies. After reading a decision rendered by the Arkansas Supreme Court, we are convinced that such instructions are worth while.

In the Arkansas case, a member of a dredge boatcrew fell overboard in the nighttime and drowned. Evidently, he was off duty and his death was in no way due to fault of his employer, a dredging contractor, or of its employees. Since the superintendent—top man on the job—was absent, the foreman sent a messenger to a near-by town to secure a funeral director to take care of the body.

The mortician charged the bill to decedent's brother. But he claimed that he looked to the contractor for payment because its foreman had summoned him. As soon as the contractor learned this, the company repudiated the foreman's authority and suit fol-

(*Concluded on next page*)


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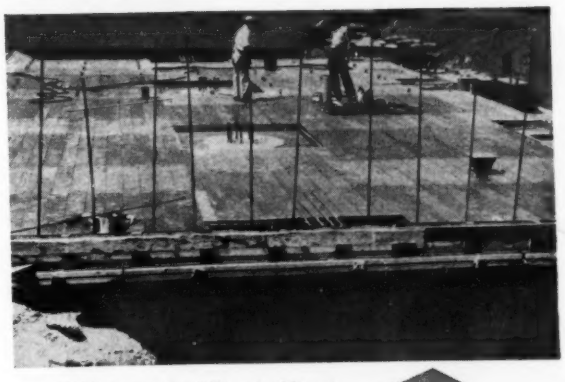

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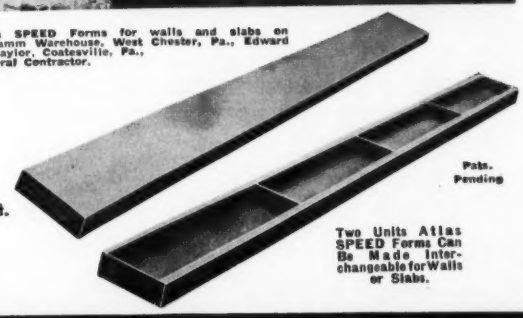

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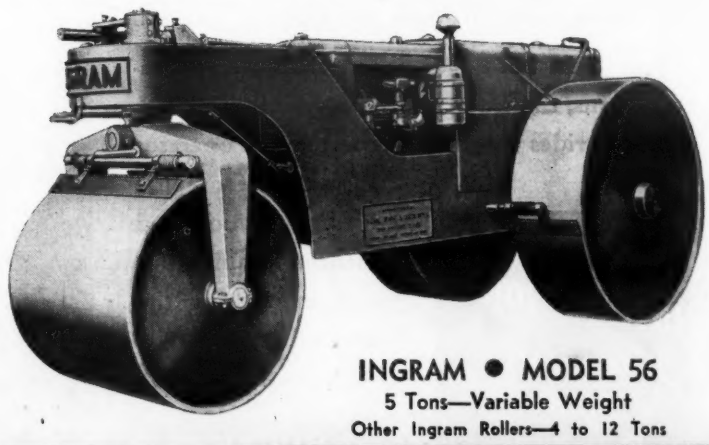

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# Avoid Legal Pitfalls

(*Continued from preceding page*)

lowed.

The trial court awarded judgement in favor of the funeral director. But the Supreme Court dismissed the case. It held that the foreman had neither express nor implied authority to act in such matters, and that the contractor had not approved what he had done on its behalf when apprised that the funeral director looked to it for payment. Said the court, in part:

"It"—the rule that minor representatives of railroad companies, for example, can bind them by hiring doctors to attend injured employees and passengers in emergencies—"has never been applied to attention of the dead, and it ought not to be so applied". The court gave this reason: that the preparation and burial of the dead is not an emergency of such immediate and pressing urgency as is care of an injured person, whether to alleviate his suffering or to prevent death from ensuing. (Wills & Sons v. Irby, 158 Ark. 52, 249 S. W. 562.)

## When Public Officials Set Nature of Contract Work

Municipal contractors should beware of contracts for work when the designation of the nature of that work has been delegated to one or more administrative officials. This caution is suggested by a decision which the Pennsylvania Superior Court rendered in the case of Borough of Weatherly v. Warner, 25 Atl. 2d, 831. There an ordinance for a street improvement provided that "whatever curbing is necessary to make a complete job, *in the opinion of the Borough Engineer and Supervisor*, shall likewise be constructed and the entire cost thereof assessed against the abutting property", etc. Holding that the ordinance was void, at least so far as the curbing was concerned, the court said:

"The Borough delegated all of its municipal power to the street committee and to the borough engineer and supervisor. The latter alone, in the exercise of the discretion delegated to him, determined that curbing should be placed along the defendant's land and upon his decision the borough seeks to charge the defendant with two-thirds of the cost thereof. By section 3 of the ordinance the 'proper officers' were empowered to purchase the necessary materials in the name of the borough. It was the street committee which determined what materials should be used. . . . This committee was directed to 'do the work of improving said streets with the borough's own force of men'. It may be that the ordinance, in providing for the macadam pavement, sufficiently described that part of the improvement and properly entrusted the street committee and the engineer with the performance of the work. . . . But as to the curbing, the ordinance sought to delegate to others the authority, not only to decide upon the materials to be used, the manner of performing the work, and the character of the finished result, but also to determine what curbing could be constructed. We think that this, in effect, was a delegation of authority by the borough to a special commission to make a municipal improvement."

## Claims for Additional Work Should Be Complete

A decision rendered by the United States Court of Claims shows that when claims for extras are made by a contractor, they should include every demand that has accrued.

A contractor presented a claim for additional work in constructing caissons deeper than called for by the contract drawings. The claim was revised and paid. A further claim for extra payment was confined to cost of temporary heating, not within the terms of the first settlement. In an action brought by the contractor to recover additional payment for equipment rentals, hoisting-engineer service, and field-force expense, the United States Court of Claims said:

"In view of the fact that the contractor . . . revised its claim and the full amount of the revised claim was paid, and . . . the further fact that in filing its claim for extra payment, the contractor confined such claim to the cost of temporary heating, we think plaintiff [the contractor's executor] is not entitled to recover any additional amount for the other items indicated." (Continental Illinois Nat. Bank & Trust Co. v. United States, 65 Fed. Supp. 908.)

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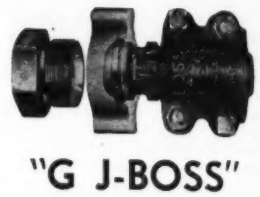

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## Interest in Safety On Construction Jobs At Michigan Meeting

There was a goodly representation of contractors and steel-erection companies at the construction session of the Michigan Safety Conference on May 20 in Detroit. Ralph R. Bozell, Manager of Service, Whitehead & Kales Co., Detroit, served as General Chairman of the meeting.

Otto S. Holmskog, Senior Construction Engineer, Employers Mutual Liability Insurance Co., presented an interesting safety program to decrease hazards and accidents in steel erection. He urged the use of hard hats, safety belts, safety-toe shoes, well constructed ladders and scaffolds, with hand rails, etc.

The safety problems of the general contractor were outlined by Frank Valasek, of Darin & Armstrong, Inc., of Detroit. Mr. Valasek, who only recently joined this organization as Safety Director, supplemented his talk with slides prepared from a collection of construction pictures. Since much of the construction activity in the Detroit area is at industrial plants, emphasis was placed on coordinating construction activities with industrial plant production, on the importance of cooperating with plant engineers to insure uninterrupted production and to prevent hazards to both plant employees and the construction workmen.

The slides showed the use of pipe rail guards on concrete pavers, fire prevention on construction jobs, the proper use of circular-saw guards, the use of scaffolds and hoists, and the safeguarding of men working in plant yards where trains are moving in and out. This visual presentation was very effective and a great deal of interest was evident.

The third speaker was J. Hastings Downie of Talbot & Meier, Inc., also of Detroit. Mr. Downie is Chairman of the Accident Prevention Committee of the Detroit Chapter of the Associated General Contractors of America and also a member of the National AGC Accident Prevention Committee. He outlined the work the national office of AGC is doing in the field of accident prevention. Mr. Downie stated that accident prevention has a place on the program of every meeting of the AGC Detroit Chapter. It is of interest that several Detroit contractors were among award winners in the 1946 National AGC Accident Prevention Contest.

Contractors in the Detroit area have been leaders in the safety-in-construction campaign for many years. The original work on the Detroit AGC Chapter's "Accident Prevention Manual" was done as long ago as 1916-1920. It has been handled by W. F. Austin, of the W. E. Wood Company, and Ralph A. MacMullan, Secretary of the Detroit Chapter. This manual's 8½ x 11 size was soon changed to pocket size for convenience. And it became the basis for the "Accident Prevention Manual" of the Associated General Contractors of America, which took it over and expanded it to cover all phases of highway, heavy-construction, and building safety. At the 1947 annual convention of the AGC, it was decided to revise the "Manual of Accident Prevention", in order to bring it up to date. This work is now under way.

The interest in safety among Detroit contractors is in part responsible for the inclusion of a construction session at the Michigan Safety Conference. It should serve as an inspiration to groups of contractors in other localities to band together in an effort to improve the construction industry's safety record.

## Award Announced by ASCE

An annual award to perpetuate the memory of the late Leon S. Moisseiff will be made by the American Society of Civil Engineers. The award is a bronze medal and an appropriate certificate signed by the President and Executive Secretary of the Society. It will be presented in behalf of the Leon S. Moisseiff Memorial Committee which has established the sum of $4,000 for this purpose.

The award will be presented for important papers published in the *Transactions* of the Society. These papers will deal "with the broad field of structural design, including applied mechanics, as well as the theoretical analysis, or constructive improvement, of engineering structures such as bridges and frames, of any structural material."

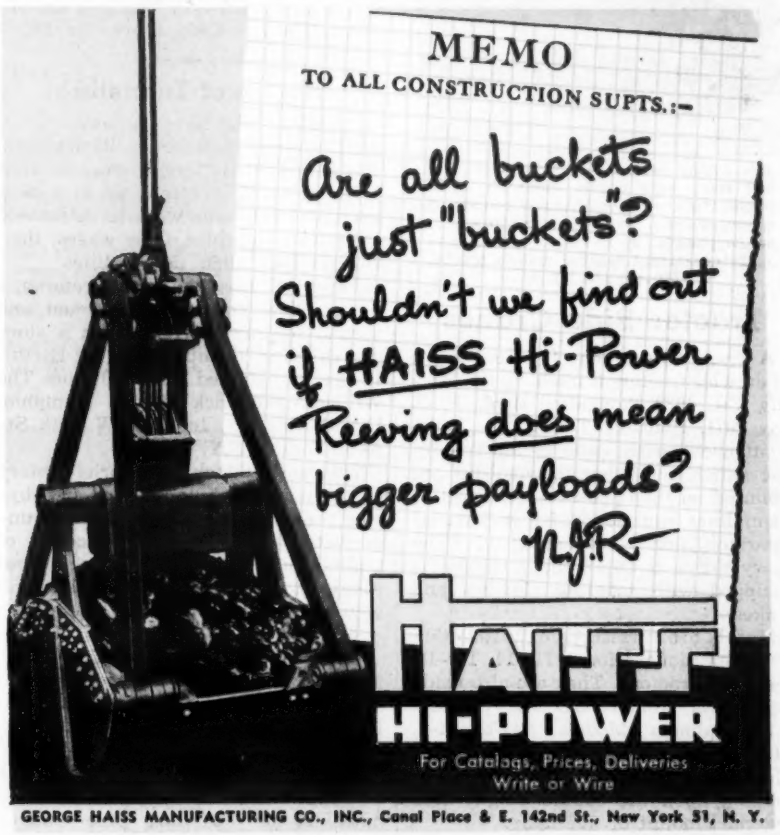
Mr. Moisseiff, New York consulting engineer, died in 1943. At one time he served as bridge engineer and engineer of design for the New York City Department of Bridges. He also helped design and acted as consultant on many bridges, including the George Washington, Triborough, Golden Gate, and San Francisco-Oakland Bay structures.

## Pumps for Many Purposes

Its complete line of pumps for all purposes is described in bulletins of The Gorman-Rupp Co., Mansfield, Ohio. The bulletins are grouped and bound in catalog form. They describe all the pump models and sizes in the line.

Features of construction are clearly shown. Uses and applications of the various models are described. Other data include price lists, performance tables, specifications, cutaway drawings and photographs, operating instructions, repair parts lists, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 67.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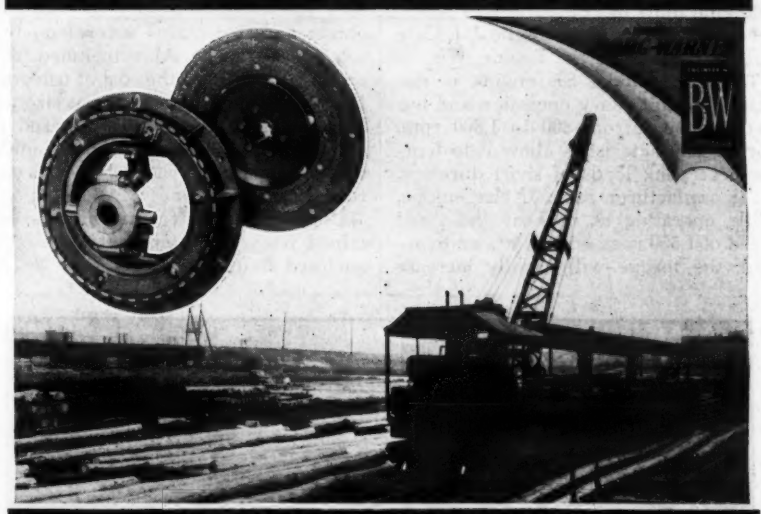


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## Tractor Side Cranes

A crane attachment for installation on crawler tractors is made by the Berg Mfg. Co., 4622 Navigation Blvd., P. O. Box 2071, Houston, Texas. The boom is attached on the side of the tractor. The winch and other mechanisms are mounted on the opposite side. Load or boom lines can be raised or lowered separately or simultaneously. The heavy-duty double-drum winch is equipped with separate clutches and brakes.

Models are furnished for installation on International Model TD-14, TD-18, and TD-9 tractors. They are also made for Cletrac Models DD and FD and Allis-Chalmers Models HD-5, H-7, HD-10, and HD-14. Lifting capacities vary from 3,400 to 34,100 pounds, depending upon the counterweight used and the amount of overhang.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 15.

## New Gasoline Engine

Engine units to fit a variety of power needs can be furnished by the J. I. Case Co., Inc., 702 State St., Racine, Wis.

The Case Model SE engine is designed for stationary operation and has engine speeds from 800 to 1,800 rpm. Torque characteristics allow it to handle near peak loads of short duration, the manufacturer says. If the engine, while operating at or near the rated speed of 1,550 rpm, encounters an overload, the torque will usually increase enough to prevent stalling. The unit will run on either natural gas or gasoline.

Bore is 3½ inches; stroke, 4 inches; piston displacement, 154 cubic inches. Standard equipment includes a combination manifold, radiator, starting crank, magneto, carburetor, hood, governor, air cleaner, clutch, thermostat, and oil-pressure gage.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 99.

## Heroes of Tunneling

Readers who have followed C. & E. M.'s recent construction stories about the Brooklyn-Battery Tunnel in New York will also be interested in a story about the men who work in its bowels, their labor troubles, their wages, their superstitions, their personalities.

Patrick J. Costello, a war veteran, a former New York City policeman, and a sand hog, has written such a story and called it "Giants Under the Earth". It can be obtained for $1.00 from The William - Frederick Press, Pamphlet Distributing Co., Inc., 313 W. 35th St., New York 1, N.Y.

The booklet includes a brief history of tunneling techniques, the step-by-step progress on a typical modern underwater tunnel job, an account of unionization and labor-management relations, as well as tales of the sand hogs at work and at play.

## Horizontal Earth Borer

A new 16-page catalog has just been issued by the Hydrauger Corp., Ltd., 116 New Montgomery St., San Francisco 5, Calif. Subject of Catalog 8 is the Hydrauger horizontal earth-boring machine for installing pipe underground.

The announcement describes the three compressed-air-operated models in which the unit is made. It gives general operating instructions for lining up the equipment and digging the holes; it lists advantages claimed for the machine; and it contains several on-the-job photographs. Also included is a graph which shows the cost of using the Hydrauger for digging various size and length holes. The graph is based on almost 3,000 individual bores under varying conditions, with labor costs corrected to 1947 rates.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 56.


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WITH THE

Grace Sweepers

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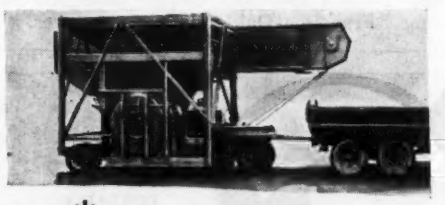

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BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS


THE AMERICAN RED CROSS Carries On! GIVE!

# Plant-Mix Surfacing Renews Old Highway

(*Continued from page 1*)

unit operated the feeding hog, cold elevator, dust-collecting fan, and the first drier; the other engine drove the second drier and its fan, plus the hot elevators.

At the top of the main hot elevator the sand spilled out onto a single vibrating screen of ¼-inch square mesh, 4 feet x 5 feet 4 inches in size. The function of the screen was chiefly to remove roots which were discharged down a chute to the ground. The sand dropped into the 4-compartment bin and from there into the weigh bucket.

Naturally the other ingredients of the mix, lime and asphalt, were not obtained as easily as the sand. Lime, used as a filler, was purchased from the Birmingham Slag Co. at Birmingham, Ala. It was shipped in hopper-bottom boxcars to a siding of the Atlanta & St. Andrews Bay Railroad at Panama City. There it was unloaded into a trough between the rails, and carried along by a worm screw to an enclosed elevator which raised it to a Blaw-Knox 50-ton cement bin.

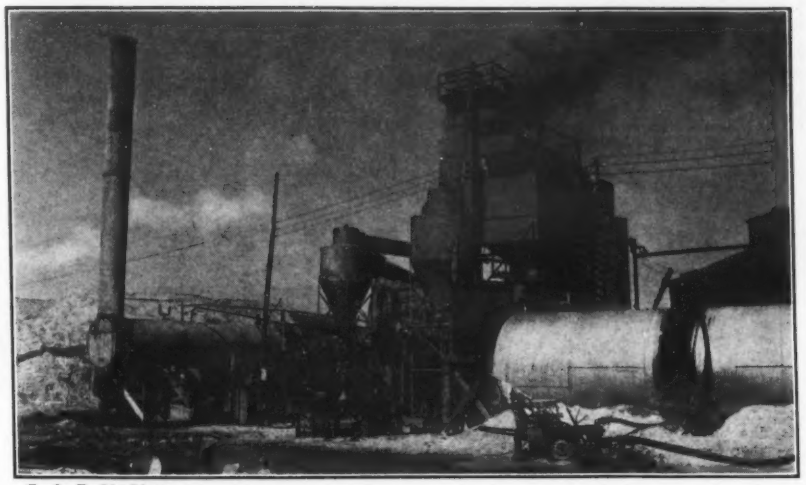
The lime was transported 16 miles to the asphalt plant in two International semi-trailer vans holding 12 tons each. At the plant it was unloaded into a hopper at the bottom of which a worm screw conveyed it to an elevator enclosed in a contractor-built silo. It was raised to the top of the 105-ton silo where another screw moved it along to the weigh bucket in the plant tower adjoining. A third International UD-18 engine drove the elevator in the silo and the two worm gears.

### Asphalt Handling

Probably few if any contractors have gone in for handling asphalt on the scale that is a part of the Smith Engineering & Construction Co. routine. The AC-8 asphalt used in the plant-mix was purchased from the Mexican Petroleum Corp. at Destrehan, La., about 27 miles above New Orleans on the Mississippi. There it was loaded directly into a barge built by the contractor in the Smith Shipyard at Pensacola, Fla., in 1945.

This barge, Gulbarco 6, is an all-steel craft, 185 x 40 x 11 feet deep. It is not self-propelled but was towed 300 miles through the Intracoastal Waterway by the tug Dixie to West Bay, Fla., which is 4 miles north of the plant. It also delivered asphalt to two other points in Florida, Pensacola and St. Marks, where the contractor had other paving jobs under way. The barge has its own light plant and living quarters for the 3-man crew.

The 7,500 barrels of asphalt that the barge carries are kept hot with steam generated by two 350-hp boilers and circulated through the bitumen in 7 miles of coiled pipe, 1, 1¼, and 1½ inches in diameter. At the West Bay dock an 8-inch steam pump on the barge unloaded the asphalt through an 8-inch jacketed line into a 144,000-gallon storage tank on the bank. Near the tank was an A. B. Farquhar Co. 25-hp oil-burning locomotive-type boiler which circulated steam through the storage tank, keeping the asphalt hot. It also drove a 3-inch pump which loaded the transport trailer trucks carrying the bitumen from the storage tank at the dock to the 44,000-gallon tank at the asphalt plant. The transfer was usually made by two Mack trucks pulling 4,000-gallon Fruehauf and Great Dane trailer tanks. A 16,000-gallon tank provided fuel oil for the boiler at this storage station.



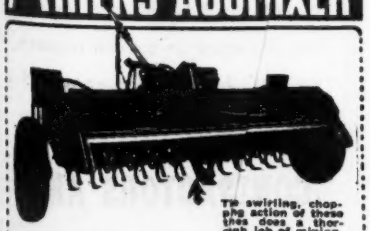
*C. & E. M. Photo*

**This shot of the contractor's Simplicity asphalt plant on the Florida plant-mix surfacing job shows the boiler at the left; the tower, driers, and burners in the center; and the fuel-oil tank at right. In the foreground is a Jaeger 3-inch pump which transferred bunker C fuel oil from tank trucks to the tank.**

A 3-inch steam-driven centrifugal pump transferred the asphalt from the transport trucks to the big storage tank at the plant. Another 3-inch pump, a rotary unit driven by a Troy steam engine, forced the bitumen through a 3-inch steam-jacketed line to the asphalt weigh bucket in the mixing tower. When the bucket was filled, a relief valve cut off the flow and the asphalt in

(*Continued on next page*)


FOR SECONDARY ROAD CONSTRUCTION...
ARIENS AGGMIXER



The swirling, chopping action of these tines does a thorough job of mixing, wet or dry.

HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Wherever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe and easy to operate . . . adjustable to any tractor . . . made 4 standard sizes 4', 5', 6' and 7'. Write for details.

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AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

# Plant-Mix Surfacing Renews Old Highway

(*Continued from preceding page*)

the line returned to the tank.

Of prime importance at the plant was the Lucey 100-hp oil-burning locomotive-type boiler which carried 150 pounds of steam pressure. The boiler burned bunker C fuel oil stored in a 15,000-gallon horizontal tank. Oil-tank trucks from Panama City kept the tank full; the transfer was made by a Jaeger 3-inch pump driven by a Le Roi gas engine.

Water for the boiler was obtained from a well, 35 feet deep, pumped through a 3-inch line by a Worthington 2-inch steam-driven pump. Similar pumps were used to pump the fuel oil from the storage tank to the burners on the driers and on the boiler. Steam was employed to atomize the oil for the driers, to turn the turbines on the driers, to keep the asphalt in the tank and lines at the proper temperature, as well as to operate the gates on the pugmill.

### The Mix

In the sand-asphalt hot-mix, 100 per cent of the sand was required to pass a No. 4 sieve. Of the mineral filler, not more than 8 per cent could pass the No. 200 sieve and the material had to show a stability of 800 pounds at 140 degrees F. The AC-8 asphaltic cement had a penetration of 85 to 100. The weights as recorded on a Kron dial scale as the materials were admitted to the 2½-ton pugmill were as follows:

| | | |
|---|---|---|
| Sand | 86.5 per cent | 4,325 lbs. |
| Lime | 8.0 per cent | 400 lbs. |
| Asphalt | 5.5 per cent | 275 lbs. |

As the job progressed, it was found that the mix originally set up for the job did not produce the required stability. So a mix of about 50 per cent dredged shell, crusher-run, passing a ¾-inch mesh down, was added to the sand for the two surface courses.

The mix was discharged from the pugmill into waiting trucks which backed under the tower. A fleet of eight White trucks owned by R. L. Williams, a Chattanooga, Tenn., hauling contractor, holding 7½ tons each, transported the mix from the plant to the road.

*C. & E. M. Photo*

**The barge Gulbarco 6 was built by Smith Engineering & Construction Co. to carry 7,500 barrels of asphalt. Here asphalt is being unloaded from the barge to the storage tank at the West Bay dock, Florida.**

### Widening and Leveling Course

The roads to be widened and surfaced were from 15 to 20 years old. They carried a 20-foot sand-asphalt road-mix pavement, 6 inches thick, which had been surface-treated with a slag-bituminous wearing course. The narrow shoulders had no consistent width. Before any widening was attempted, the extremely rough and uneven spots in these old surfaces were smoothed over with a leveling course of plant-mix.

In preparation for this initial course, the highway surface was first carefully swept clean with a Grace 10-foot rotary broom pulled by a Farmall rubber-tired tractor. A tack or paint coat of RC-1 asphalt was then applied along half the pavement width by an Etnyre 659-gallon distributor mounted on a Mack truck and using a 10-foot spray bar. From 0.02 to 0.06 gallon of bitumen per square yard was shot at 125 degrees F along 1,000-foot stretches. Only short intervals were covered at a time because sand was apt to blow off the beaches onto the bitumen.

Trucks then hauled the plant-mix to the road and dumped it in a windrow along the half width that had just received the tack coat. The material was deposited at approximately 300 degrees F, a loss of only about 10 degrees in transit from the plant.

Following closely behind the trucks

(*Concluded on next page*)

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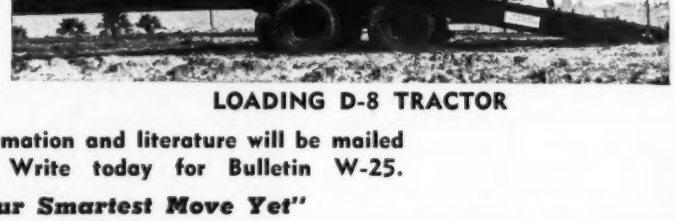

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for contractors, highway officials and distributors wanting further details or printed matter from the manufacturers advertising in these pages. Our Reader Service Department will be glad to forward any literature or special requests you mail to us at the above address.

**CONTRACTORS AND ENGINEERS MONTHLY**

# Plant-Mix Surfacing Renews Old Highway

(Continued from preceding page)

were two Caterpillar No. 12 motor graders, one behind the other. The first machine knocked the windrow down and rough-graded the material, while the rear unit did the final leveling and shaping. A couple of passes with both graders was usually sufficient to lay this leveling course, which averaged a little better than ½ inch thick or about 60 pounds to the square yard. A 10 and a 12-ton Buffalo-Springfield tandem roller compacted the material behind the graders.

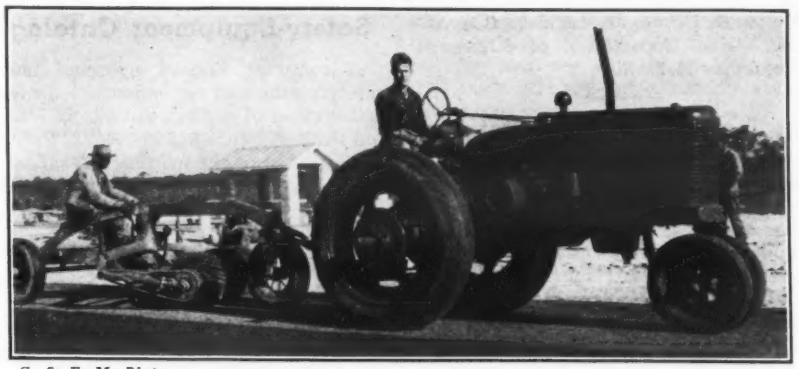
During these operations traffic was maintained on the other half of the road. The usual procedure was to work half a day on one side, and then complete the full width in the rest of the day. An average of 2 miles of the full 20-foot width of leveling course was generally finished in the 10-hour day.

When the leveling operations were finished, the 2-foot-wide x 1-foot-deep widening trenches were dug on each side of the pavement. A 3-foot-wide x 1-foot-deep drop blade was bolted a couple of feet from the heel of the blade on one of the No. 12 graders. By setting the long blade at an angle, the trenches were easily cut to the proper dimensions in the sandy soil. A Caterpillar Fifty tractor with slick treads rolled the newly cut trench.

The foot-deep trench was then filled with plant-mix laid in three courses of 7 inches each, the individual courses being compacted to 4 inches. Trucks discharged the material into the hopper of a No. 60 All-Purpose spreader driven by a Continental Red Seal engine. The machine can be regulated to any width between 6 inches and 8 feet for laying bituminous mixes; in this instance it laid the material to the exact 2-foot width and 7-inch depth. Each course was rolled first with the slick-track tractor, and then with a Buffalo-Springfield 3-ton trench roller which runs its front pilot wheel and rear compression roller in the trench and the third wheel on the pavement.

### Surfacing

Next the two-course pavement was laid in two 12-foot lanes by two Barber-Greene Tamping-Leveling Finishers. As a preliminary to the base course, a tack coat of RC-1 was applied to the old pavement and leveling course at the same rate of 0.02 to 0.06 gallon per square yard. Each course of the same material was laid about 1¼ inches loose and was compacted by the two tandem rollers to a 1-inch thickness. The work was done in three courses—leveling, base, and top—for better compaction and a smoother-riding surface.



*C. & E. M. Photo*

**Before receiving its tack coat and leveling course, a section of U. S. 98 in Florida is swept by a Grace 10-foot rotary broom pulled by a Farmall rubber-tired tractor.**

Each of the Finishers worked a day at a time; one did a 12-foot stretch one day and the other laid the adjoining width on the following day. The average production was about 1 mile of either base or top course paved to full width in a 10-hour working day. The surface has a crown of ¼ inch to the foot, and the side slopes are 1 on 1.

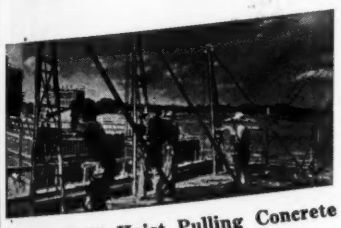
### Quantities and Personnel

The project got under way early in December of last year and was completed in June. The major items in the contract included:

| | |
|---|---|
| Plant-mix | 76,773 tons |
| Tack coat, RC-1 | 34,995 gals. |

A force of 50 was employed by the Smith Engineering & Construction Co. of which 15 were stationed at the asphalt plant. Malcolm H. Williams was Superintendent for the contractor. For the Florida State Road Department, S. D. Hall was Project Engineer and M. Douglas Sullivan was Inspector. The contract was supervised by the Third Division of which H. H. McCallum is Division Engineer with headquarters at Chipley. F. Elgin Bayless is Chairman of the Department, and E. C. DeGarmo is State Highway Engineer.


COFFING HOISTS



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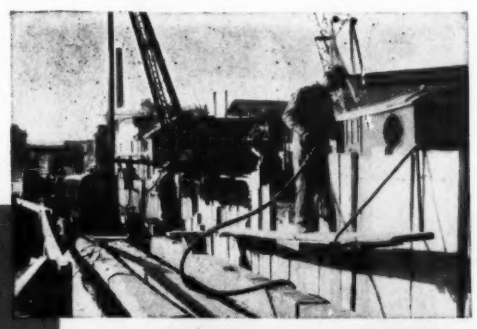

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## Data on 6th Short Course On Roadside Development

A mimeographed report of the Sixth Annual Short Course on Roadside Development is now available in bound form. It will serve as a source of reference for those unable to attend, or a review for those who were there. The course is sponsored by the Department of Landscape Architecture, The Ohio State University, with the Ohio Department of Highways cooperating.

Course papers reported in this bound pamphlet cover insecticides and germicides, weed control by chemical treatment, shade-tree disease research, asphalt emulsion in seeding operations, the latest in specifications covering landscape-development operations, new roadside-operations equipment, right-of-way control, and others.

Copies of the report may be obtained by writing Professor Charles R. Sutton, Department of Architecture and Landscape Architecture, The Ohio State University, Columbus 10, Ohio; or to Dallas D. Dupre, Jr., Landscape Architect, Ohio Department of Highways, Columbus 15, Ohio.

## Tractor-Shovel Bulletin

Features of its tractor shovel are shown in a bulletin issued by the Lessmann Mfg. Co., 20th and Easton Blvd., Des Moines 4, Iowa. These features include an improved design in all three operating positions: digging, carrying, and loading. Digging or lifting does not lessen traction, it is said, because it does not take weight off the rear. The front axle is under the center of gravity of the load to prevent teetering.

The bulletin includes a drawing of the inside of the operator's section, showing the location of controls and their functions. It also devotes a page to a description of the rear hoist assembly and specifications of the new Lessmann shovel unit.

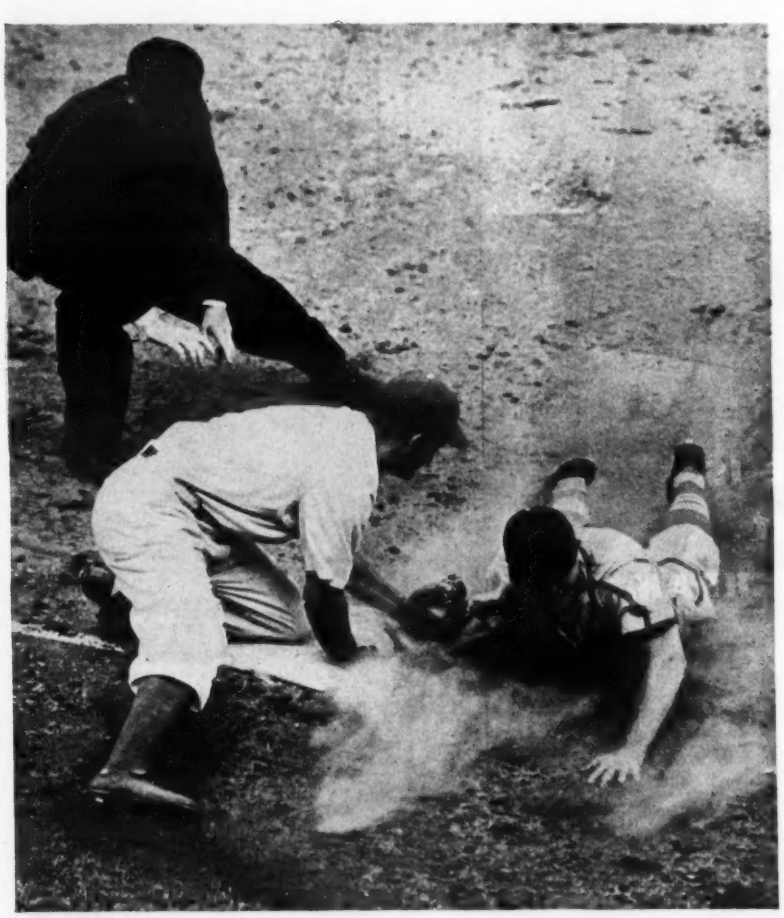
Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 76.

## Safety-Equipment Catalog

A complete line of eye and nose safety equipment for construction men is described in catalogs put out by Willson Products, Inc., 572 Thorn St., Reading, Pa. This equipment includes blasting and welding helmets, safety goggles in many styles, welding handshields, anti-fog compound for lenses, dust respirators, etc.

The catalogs include pictures of the various styles in use, diagrams showing features, and tables of specifications and recommended uses.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 85.

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The safety factors built into Naylor light-weight pipe have made it outstanding in the construction field. The exclusive Lockseam Spiralweld provides the reason. Acting as a continuous expansion joint, this structure absorbs shock loads, vibration, expansion and contraction . . . insures closer conformity to topographical conditions without any sacrifice of strength. It makes possible economies with safety in using Naylor light-weight pipe on jobs normally requiring heavier wall pipe. For high and low pressure air and water lines, dredging lines, hydraulic sluicing, de-watering and drainage, sand and gravel conveying and many other applications, it will pay you to specify Naylor light-weight pipe.

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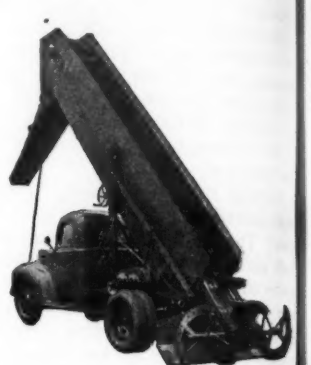
✓ HIGHWAY AND AIRPORT BUILDERS
✓ ENGINEERS



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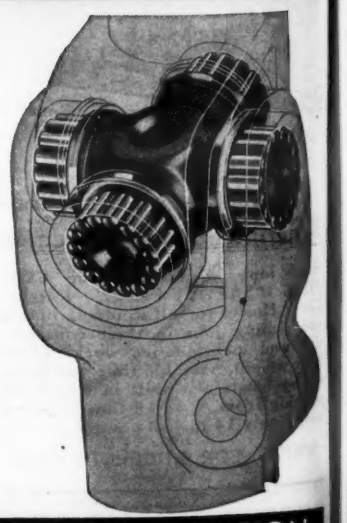

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MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2026 Harrison Ave., Rockford, Ill.

The South Dakota State Highway Maintenance Department recently purchased two 26-foot Fruehauf trailers of special design for hauling heavy equipment to and from district shops and to jobs. In loading, the nose of the trailer is tilted down so that self-propelled machinery goes aboard under its own power. A winch mounted on the tractor lifts the loaded trailer onto the coupler.

## The Kiss of Death Given by Herbicides

The kiss of death is given to weeds by a group of herbicides produced by Howard Hanson & Co., Beloit, Wis. Designed for use in weed control, a line of compounds to meet various weed problems is available.

Weedeath 2-4D is a water-soluble selective herbicide. The manufacturer states that when it is mixed with water and sprayed on broad-leaf weeds, it is absorbed and kills them down through the root tips. Within a week to ten days the plant begins to show the effect, and gradually dies in two to four weeks. Weedeath is made in 10, 20, and 40 per cent wet solutions. Where wet sprays are not practical, the company recommends Esterdust "V", a sodium salt of 2-4D.

The company also manufactures Dynitro weed and grass eradicator. This compound is said to kill most annual weeds, and above-ground foliage of perennial weeds and grasses. It acts as a chemical mower. Regrowth of perennial weeds and grasses will occur when soil-moisture conditions permit, but it will be slower.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 31.

## Equipment to Suit the Job

Methods of utilizing small-size diesel track-type tractors, diesel engines, and electric sets on jobs which do not require larger models are described in a new catalog issued by the Caterpillar Tractor Co., Peoria 8, Ill.

This 16-page color booklet is entitled "Big Little Jobs". It shows Caterpillar D2, D4, and D6 track-type tractors in use with straight and angling bulldozers, scrapers, loaders, scarifiers, disks and harrows, and tampers and chisels.

Form 10183 emphasizes that job needs and equipment should be correlated. It also stresses that improved results are obtained when supplementary equipment such as power shovels, draglines, crushing plants, or light plants are driven by the proper-sized diesel engines and electric sets.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 83.

## Data on Mobile Crane

A bulletin about its rubber-tired Model 1000 mobile Speedcrane is being sent free upon request by the Manitowoc Engineering Works, 16th and River Sts., Manitowoc, Wis. This machine is readily convertible to shovel, dragline, clamshell, or lift-crane service.

The catalog lists ten features claimed for the Model 1000 and illustrates several of them with photographs. The last page contains a table showing the weights which can be lifted at 12 to 80-foot radii with boom lengths of 45 to 100 feet.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 61.

## Gas-Driven Sand Spreader

A gasoline-engine-driven spreader is described in a bulletin issued by the Kahl-Kaser Inc., 6450 LeGrand Ave., Detroit 11, Mich. The Butler sand distributor can be used for spreading sand, calcium chloride, cinders, or other abrasives. It is powered by a 1½-hp engine. The spreader is attached by hanging it over the tail-gate of a dump truck.

The catalog tells about the unit in operation, illustrates a fast method for sanding intersections without turning the truck around, and lists the specifications of the Model K-1.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 58.


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All of these demolition blocks can be used in place of TNT or 40 to 60% dynamite except in underground operations. An added advantage is that the M-3 and M-4 blocks will give closer contact between the explosive and the object to be blasted. They are ideal for general demolition work, land clearing, excavating, ditching, quarrying, fire control, above ground mining, road construction, stump blasting, seismographic surveying, "blowing" out oil well fires and many other industrial uses. All blocks can be used under water.

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**Purchasers of Demolition Blocks** are required to observe all applicable laws regulating the sale, use, handling and storage of explosive materials.

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Demolition blocks are high explosives which detonate with a quick, shattering blast. Their effectiveness is more *than twice that of the average commercial dynamite* and 25% more than that of T.N.T. They are relatively safe to handle and stable to store. They are *less sensitive to shock and friction than dynamite,* and can be burned (in small quantities) without exploding. The four types of demolition blocks are detonated by special electric or non-electric blasting caps or by detonating cord (primacord).

**DESCRIPTION AND PACKAGING**

**M-1 Chain Demolition Blocks** consist of eight tetrytol blocks each measuring 2 x 2 x 11 inches and weighing 2½ lbs. The blocks have a tetryl booster pellet in each end and are cast onto a single length of detonating cord. Each block is enclosed in asphalt impregnated paper and the chain is packed in a cloth haversack equipped with carrying strap. Two chains are packed to a wooden box.

**M-2 Demolition Blocks** are individual blocks identical with M-1 but they have a booster pellet and threaded cap well in each end. The M-2 blocks are packed the same as the M-1.

**M-3 Demolition Blocks** are 2¼ lb. blocks of moldable plastic explosive of composition C-2 or C-3. Each block is wrapped in glazed paper and inclosed in a cardboard carton. Eight blocks are packed in a cloth haversack; two haversacks in a wooden box.

**M-4 Demolition Blocks** are ½ lb. blocks of the same composition as the M-3. These are packed 100 to a wooden box.

***Prices, F. O. B. location, are as follows:***

**M-1—75 cents per chain of eight blocks (2½ lbs. each)**
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**Minimum Quantities—1,500 lbs.**

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| WAA OFFICE | M-1 | M-2 | M-3 | M-4 |
|---|---|---|---|---|
| Birmingham | 525,031 lbs. | 430,922 lbs. | — | — |
| Chicago | 716,720 lbs. | 44,707 lbs. | — | — |
| Cincinnati | 492,520 lbs. | 1,056,250 lbs. | 50,965 lbs. | — |
| Denver | 2,731,130 lbs. | 143,720 lbs. | 643,964 lbs. | — |
| Grand Prairie | 116,560 lbs. | 45,772 lbs. | 376,679 lbs. | — |
| Los Angeles | 1,682,580 lbs. | 870,500 lbs. | 474,480 lbs. | — |
| Minneapolis | 1,111,960 lbs. | 1,664,320 lbs. | — | — |
| Nashville | 194,440 lbs. | 1,189,640 lbs. | 804,093 lbs. | — |
| New York | 202,165 lbs. | 164,945 lbs. | 610,636 lbs. | 1,327 lbs. |
| Omaha | 1,335,110 lbs. | 278,930 lbs. | 316,946 lbs. | — |
| Philadelphia | 352,225 lbs. | 384,845 lbs. | — | 1,896 lbs. |
| Portland | 592,260 lbs. | 877,880 lbs. | — | — |
| Salt Lake City | 676,105 lbs. | 1,843,563 lbs. | 4,576 lbs. | 946 lbs. |
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1276

# Service Plus Safety We Ask of Our Roads

## But We Can Attain Them Only With Control Over Right-of-Way, Land Use, And Highway Access

✦ OUR concept of a road has broadened considerably. Where we once thought of a narrow piece of pavement, we now think of a complete highway structure designed and built for traffic safety and driver service. Safety and service, moreover, are exacting goals. Today they call for improved highway facilities to accommodate the increasing numbers and weights of vehicles and the higher speeds at which they operate. And they require every modern resource and our best engineering ability.

An important element in the design and construction of safe modern highways was discussed by three Public Roads Administration representatives at the Sixth Annual Short Course in Roadside Development in Columbus, Ohio, last February. It is the control of right-of-way, of highway access, and of the use of adjacent areas.

### Types of Control

Wilbur H. Simonson, Chief of the Roadside Section of the Public Roads Administration, cited some of the controls which affect highway development. Any form of control, he said, implies that a positive position has been taken and mutually agreed upon with reference to a particular problem.

Some of the controls to be considered and used are as follows:

1. Structural controls such as river bridges, tunnels, viaducts, etc., elevated expressways, walls and fencing.

2. Lay-of-the-land controls, as when raised on embankments or placed in depressed sections; or when located in rough, mountainous topography where heavy cuts and fills are more or less continuous and leave no space for roadside access.

3. Location controls: along river banks or lake shores, etc.; or parallel and adjacent to a railroad, etc.

4. Lay-out controls, with frontage or border service roads separated by an outer buffer strip to reduce local crossovers and traffic interference to a minimum, etc.

5. Right-of-way controls such as liberal widths owned in fee simple; or limited width actually owned but supplemented by limited rights, such as grading, planting, and maintenance easements in special cases, etc

6. Protective controls such as comprehensive zoning (rural or urban); strip zoning or similar devices (billboard laws); highway development rights, etc.; controlled-access legislation, enabling acts, etc.; and retaining walls and fences.

7. Public reservation areas where complete control is automatic, as in national parks and forests, Indian reservations, etc.

There must be some degree of control on important roads, said Mr. Simonson, to solve the traffic-safety problem. But the relative degree and form of physical control favored in a particular situation will vary widely on the different sections and systems of highways in the several states.

In each road situation, at the time road location and development studies are undertaken, the engineering team must take three steps: (1) analyze the proposed highway requirements in relation to existing land conditions and uses; (2) evaluate and compare alternate possibilities of control; and then (3) select that solution in which all the considered factors are in balance.

### Need for Facts

To take these steps, the engineers must have available three major classes of facts:

1. Facts regarding the topography of the highway strip or alternate strip locations, generally depicted on existing topographic maps or aerial photographs in combination.

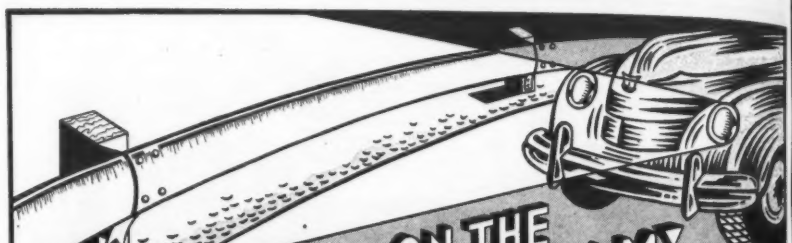
2. Facts concerning the present kind and degree of land usage and property values, generally available in aerial photographs and in property plats and tax-assessment records.

3. Facts showing the value and direction of major traffic movements, developed by origin and destination traffic surveys. They are now usually depicted on a new kind of map. This differs materially from the familiar form of street-traffic map, and is called a "motorgraphic" map—a map of movement.

### Roadside Development

Eight basic steps were listed by Mr. Simonson in progressive order to show how all portions of the highway right-of-way and the lands immediately adjacent may be given equal consideration. They are:

(*Continued on next page*)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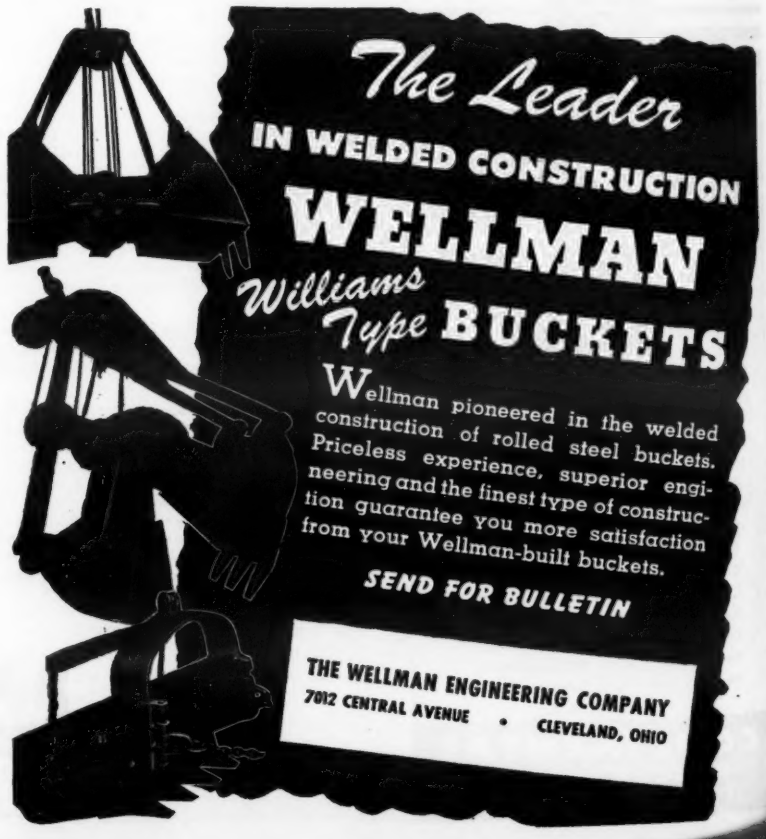
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# Service Plus Safety We Ask of Our Roads

(*Continued from preceding page*)

1. Conserving permanent landscape features through adjustments in location.
2. Salvaging landscape soils and materials during construction.
3. Improving grading and drainage conditions by streamlining.
4. Protecting the highway from erosion.
5. "Building-in" traffic safety.
6. Keeping down annual costs of maintenance.
7. Simplifying highway operations.
8. Improving overall highway appearance.

### Highway Safety

Highway safety and effectiveness are both served when location—alignment, profile, and cross section—is carefully adjusted to fit topography and prevailing land use in the first stages of highway surveys and plan preparation.

With the rapidly mounting death toll, any move that will save lives is worth serious consideration by highway engineers, and especially those concerned with sound roadside development. Formerly, traffic safety was not thought to be connected with land usage outside the right-of-way. But it is now recognized that some degree of roadside regulation and border control is necessary for traffic safety. Roadside buildings, billboards, hedge plantings at driveways and intersections, and many other forms of private-land development may interfere with sight distance, contribute to cross-movement of traffic, and otherwise cause serious traffic hazards.

Paved surfaces normally occupy but one-fourth of the width of a modern highway. Sound landscape development of the unpaved three-fourths of the highway as a unit with the paved surface is essential to public convenience and safety. Because the manner of developing lands adjacent to the right-of-way is also a factor in traffic safety and convenience, some control of access and adjacent land use is now being provided on expressways and arterial highways.

### Right-of-Way Control

The economic and legal aspects of right-of-way control were the subject of a paper presented by David R. Levin, Head, Special Administrative Studies Unit, Division of Financial and Administrative Research, Public Roads Administration. Mr. Levin pointed out the many evidences of our present inferior highway service. Highway planners have found, he said, that a more serviceable rather than a more extensive highway system is our present-day need.

One of the most important means to that end is the effective public control of highway access and of the areas adjacent to the road. There must be a much more rational adaptation of facility to function than has existed heretofore, he said.

### Legal Control of Access

The controlled-access highway has now been sanctioned by comprehensive statute in twenty-four states, wholly within the last nine years. In addition, the new Missouri Constitution authorizes the State Highway Commission "... to limit access to, from, and across state highways where the public interest and safety may require . . ." This is the first instance of legal sanction of highway-access control by organic law. Several states, Oregon and Wisconsin, for example, permit the acquisition of "access rights". But both states are now seeking more detailed legislative authorizations.

The right of access has been enjoyed for centuries by property owners adjoining public roads. Therefore, most legal authorities and students of government have felt that extinguishment of the right ought to be authorized by specific enactment of the state legislature which responds directly to public opinion. However, a state law on the subject is desirable for other reasons. Many special matters need to be dealt with in the establishment of express highways, such as intergovernmental arrangements, local consent to the closing of intersecting streets, penalty provisions, and other related matters.

### Existing, Proposed Expressways

Public Roads Administration studies reveal that there are at least 1,244 miles of controlled-access highways in the United States. Approximately 2,185 miles of such expressways in twenty-seven states and the District of Columbia are being planned with Federal funds for early construction. In addition, a considerable mileage of controlled-access highways is contemplated by state and local highway authorities in the various states.

It is significant to note this: all advance engineering projects planned with Federal funds (as of September, 1946) and scheduled in California, Illinois, Louisiana, Maryland, Michigan, New Jersey, New York, Pennsylvania, and Rhode Island are of controlled-access design.

### Right-of-Way, Billboard Problems

By prudently exercising the control of access now sanctioned in approximately half the states, prospective roadside establishments such as service stations, restaurants, taverns, and similar enterprises, may be controlled as to location or design or both. Or they may be excluded entirely on express highways. However, one important aspect of roadside control is not achieved necessarily and automatically with the regulation of access: it is public control of the right of view which involves, largely, the billboard problem.

It is of interest to note that of the twenty-four state statutes that sanction the comprehensive control of highway access, ten laws specifically include control of *view* as well as air, light, and access (in Florida, Illinois, Indiana, Kentucky, Louisiana, Michigan, New Hampshire, New Mexico, Oklahoma, and Utah). In addition, Maryland enacted a separate law that achieves the same results.

Solution of the billboard problem has been hampered largely by inadequate legal enabling authority as well as by ineffective administration. As with all public enterprises, a sound legal mechanism and good administration thereof are necessary to obtain effective results.

### Right-of-Way Reservations

Mr. Levin called attention to a progressive right-of-way practice adopted recently by the Ohio Department of Highways. (See C. & E. M., Nov., 1946, page 26.) By means of highway reservation agreements, Ohio acquires specified "reserved" areas for nominal consideration. At some future time,

(*Continued on next page*)


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(*Continued from preceding page*)

perhaps in five or ten years, the customary easement for highway purposes will be acquired. Meanwhile the owner is permitted to use the reserved areas for all normal purposes not inconsistent with the future use of the marginal strips as highway right-of-way. By this device, the State expects to prevent the erection of buildings and public-utility facilities that would increase the cost of acquiring easement in the future.

The device as so conceived is substantially identical with the concept of highway development rights recently recommended as an alternative to outright acquisition of road-bordering lands by the National Interregional Highway Committee and the Public Roads Administration.

### Need for Roadside Surveys

Today the importance of areas adjacent to public roads has been brought into sharper silhouette than ever before. There is urgent need, accordingly, for thorough survey of roadside conditions on all important routes.

Such a survey should comprehend an inventory and logical classification of all roadside uses and structures, within a ribbon perhaps 1,000 feet wide on each side of the right-of-way outer boundaries, or such other distance as seems desirable. The type, location, size, and nature of structures should be included. The location and design of all entrances and exits should be noted. The size, location, and nature of advertising structures and the relationship of such advertising matter to the uses of the land whereon it exists should be ascertained.

Mr. Levin observed that these comprehensive surveys of areas adjacent to public roads may require substantial funds. Fortunately, ample funds for highway-planning activities are already available from the so-called 1½ per cent funds authorized under Section 8 of the Federal-Aid Highway Act of 1944, and may be used for this purpose. The Public Roads Administration will be glad to assist and cooperate in the initiation and execution of roadside surveys.

### Some Practical Aspects

Some of the practical problems in fitting the roadside into the complete highway, to provide the maximum safety and appearance with minimum cost, were discussed by George B. Gordon, Landscape Architect, Public Roads Administration. He pointed out, first, that adequate right-of-way is essential. Good highway location, fitting the lay of the land, is another requirement. A good finished appearance for the highway depends largely upon good location, good rounded slopes, and warped grading treatment as a foundation for seeding or other planting.

If we are to have proper highway design and right-of-way development with reasonable provision for future widening of traffic lanes, we must acquire the necessary right-of-way before highways are constructed or reconstructed on new locations, he said.

The eight basic steps in roadside development outlined by Mr. Simonson must be considered in highway surveys, right-of-way acquisition, and plan-preparation stages as well as during construction and in maintenance. Over the years, Mr. Gordon said, experience has taught us that every type of highway begins in right-of-way acquisition and ends as a right-of-way development or land-management problem.

### Landscape Conservation

Landscape architecture is founded on this basic principle: the best use of land with the least possible damage to, or destruction of, existing features of the site on which a home, a road, a bridge, or any other man-made structure is built. The years have demonstrated that highway development can be carried out without serious permanent damage to the landscape features of the route, if highway engineers and landscape architects work together as a professional team towards that common objective.

The natural roadside features which merit preservation and protection during construction make up an extensive list. For the sake of brevity, Mr. Gordon grouped them in four main classes:

1. Trees, grasses, and vegetation representing all the variations of natural vegetation as influenced by climates and topography.
2. Shore-line areas suitable for special wayside development, springs, streams and lakes, and ocean shore lines adjacent to the highway.
3. Natural hill and mountain slopes above and below the roadway; outcrops of weathered rock; and various unusual geologic formations affected by highway construction.
4. Agricultural lands, potential sites for industrial, airfield, or recreation-

(*Concluded on next page*)

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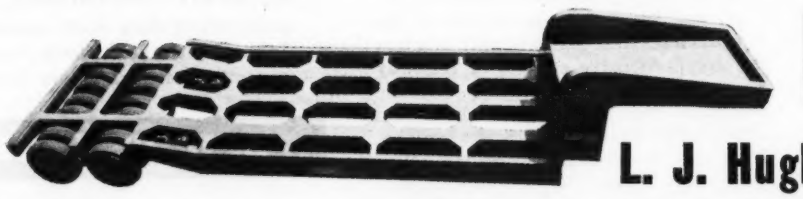

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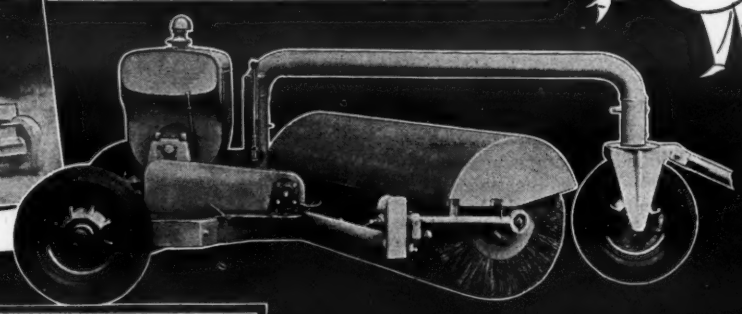

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(*Continued from preceding page*)

area development adjacent to highways and seriously affected by highway construction.

All trees, Mr. Gordon reminded his audience, are not worth saving. But by teamwork between right-of-way, construction, and landscape engineers, we can select those trees which are of healthy, long-lived types. We can pick out those that will repay money spent for right-of-way, shifting of alignment, tree-well construction, etc., to save them. Trees unavoidably damaged to the point of losing half their root systems, for example, should be removed during construction, not provided with a costly retaining wall or well in which to die.

Travelers in desert or dry country appreciate two roadside landscape features more than any others—shade and water. Where there are only a few trees, a group of cottonwoods along a creek is something no traveler will forget when the thermometer climbs above 100. In arid and in humid, well watered country, shade, vegetation, and water occur together and must be conserved together. What we call "recreation" is more closely connected with water in its various forms than with any other type of landscape feature.

Here are a few ways in which the highway construction team can conserve water and the shore lines connected with it:

1. Study existing springs, stream, and shore-line areas before construction. Consider the best of these areas among other control points in selecting a new highway location. Acquire the space needed for a well planned site development.

2. Design spring development and shore-line wayside areas to meet the needs of the traffic using the road. Develop these spring and shore-line areas with two purposes in mind—how the public can best use the facilities provided; and how these facilities can be developed without polluting water or damaging the growth and natural shore-line areas themselves.

3. It is always advantageous to design wayside areas and safety turnouts as a part of original highway construction plans.

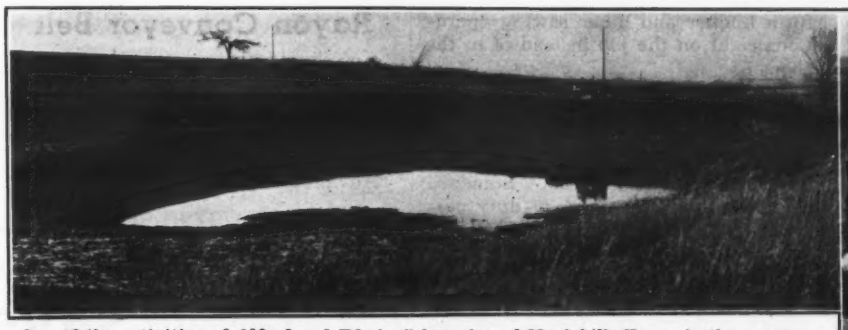
### Stream Conservation

Mr. Gordon believes that, above all things, we must not change stream courses during construction if it can possibly be avoided. They are the products of natural forces of water volume and velocity in combination with rocks, soil, and existing growth along the banks. It is easy enough to change a streambed within a few hours with modern excavating equipment. But we have all seen it done, particularly in mountain country, with resulting destruction of biological factors, streambank erosion, and destruction of highway embankments and private-land developments in after years. Teamwork between engineer and landscape architect in the study of watersheds and road locations is the essential foundation for safe streambed-channel changes. On a number of parkway projects, such teamwork resulted in the decision to leave the streams where the Lord put them.

### Conservation of Land

There is one last type of conservation which can and should be built into our highways. And it is most important. This is the conservation of land, not only within the highway right-of-way but also above and below it.

In conclusion, Mr. Gordon said that professional teamwork between highway engineers concerned with right-of-way, location, landscape development, soils, construction, and maintenance is essential. With that sort of staff organization and teamwork, we can build safer, more convenient, more beautiful and, therefore, more useful highways in the years ahead.



One of the activities of Alfred and Edwin Schwanke, of Maplehill, Kans., is the construction of stock ponds. Here a Caterpillar D2 diesel and rotary scraper are engaged in this type of work. Right, Edwin and Alfred Schwanke with their D2.


TRANSITS and LEVELS
HEADQUARTERS for REPAIRS—any make

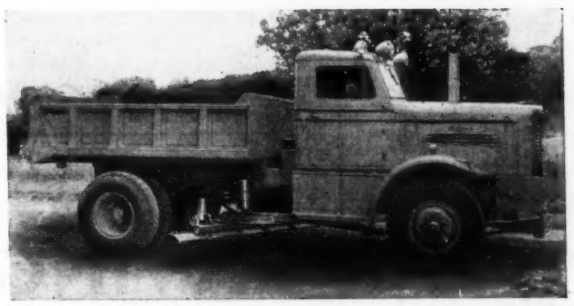
We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalog CE-37 of Engineering Instruments, Engineering Field Equipment and Drafting Room supplies.

WARREN-KNIGHT CO.
Mfrs. of Sterling Transits & Levels
136 N. 12th St. • Philadelphia, Pa.



BURCH HAS THE RIGHT MAINTENANCE EQUIPMENT



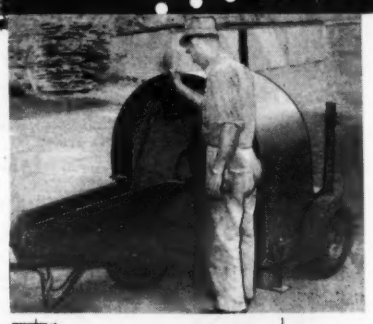
GREATER CLEARANCE WITH THIS "TILT-LEV" BLADE — POSITIVE HYDRAULIC CONTROL—FITS ANY STANDARD TRUCK. WRITE FOR FOLDER "TILT-LEV CE-7."

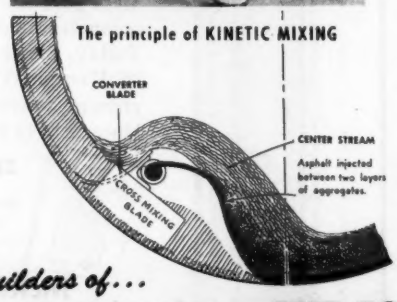
LAYING STONE MAT WITH BURCH FORCE FEED SPREADER. DUAL FEED CONTROL ASSURES UNIFORM DISTRIBUTION. ATTACHES TO ANY STANDARD TRUCK. FOLDER #747.

THE BURCH CORPORATION
SINCE 1875
Crestline, Ohio



THIS MIXER makes possible . . . bidding on SMALL asphalt jobs!






Look at this mixing principle. See how the converter blade peels off the material and cross mixing blades fold the material in under. Note too that the asphalt is injected in *between* the two streams.

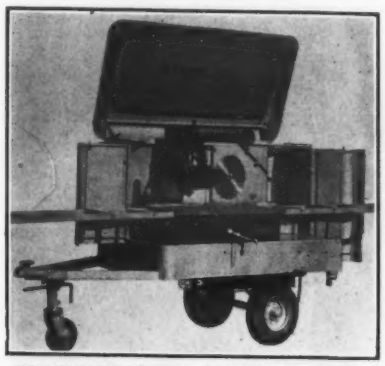
Asphalt is carefully metered and can be mixed in the material in amounts up to 8 gallons in 6 seconds. Kinetic mixing is fast—3 cu. ft. in 30 seconds. It means high speed mixing that permits the fast profitable handling of jobs that are generally a headache. Ask for Bulletin K-100 and let us give you the name of a Foote dealer near you.

*Also See Page 22*

the FOOTE Kinetic mixer

*Builders of...*
Adnun Black Top Pavers, MultiFoote Concrete Pavers, and Foote Kinetic Mixers.

THE FOOTE COMPANY, INC.
1916 State Street, Nunda, N. Y.



The Nall Mobil-Shop is built around the Nall Woodworker, a radial-arm type of woodworking saw. The rubber-tired unit can be transported right to the job site where it works inside or outside.

## Sawmill on Wheels

A portable sawmill on wheels is manufactured by the Equipment Engineering Co., a division of The Nall Corp., St. Charles, Ill. It attaches to a car or truck, and it can be used for cutting form lumber and other sawing operations right on the job instead of in the shop.

The Mobil-Shop is built around the Nall Woodworker, a radial-arm type of woodworking saw. It has extension tables and a weatherproof storage place for tools and hardware. Standard equipment includes a heavy-duty zipper-closed tarpaulin cover. The unit works inside as well as outside, for it rolls through any standard-size door, the manufacturer says.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 82.

## Mack Advances McCurdy

The appointment of W. T. McCurdy as District Manager for the states of Tennessee and Arkansas is announced by Mack Trucks, Inc., New York City. In his new capacity Mr. McCurdy will supervise all of Mack's activities in these two states. He will make his headquarters in Memphis, Tenn.

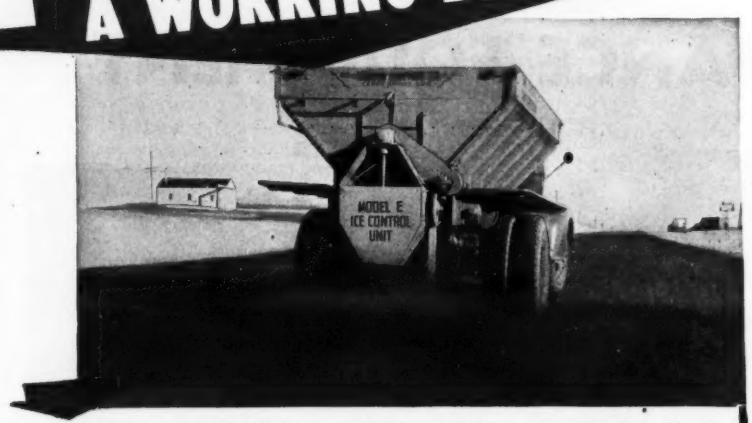
## Rayon Conveyor Belt

A new conveyor belt for long lifts has been developed by Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J. It uses rayon-cord plies as strength members.

Advantages claimed for the Ray-Man Tension-Master belt are: troughs easily, has virtue of fiber resilience, can utilize conventional-type idlers and pulleys, can be field-spliced with conventional methods.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 26.

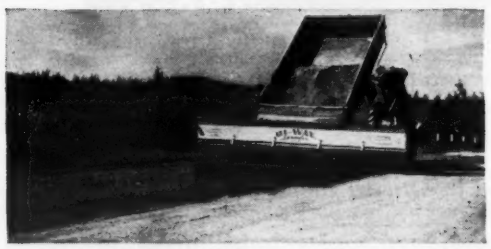

EVERY DAY A WORKING DAY




THE VERSATILE HIGHWAY MODEL "E"

Here is the four-way answer to street and highway problems. The new *Highway Model "E" Spreader* can be used for positive ice control in winter, dust control with calcium chloride in summer, for spreading seal coats on oil, and, by removing the distributor disc it is ideal for spreading small rock and chips for shoulder maintenance. When operating as an ice control unit, the *Model "E"* casts sand or cinders *low* to the highway, eliminating interference with traffic. Material is spread ahead of rear wheels of truck providing traction for truck and *safety* at any operating speed. It will cover the full width of a 2 or 4-lane highway in one operation. All controls are within easy reach of the driver's seat making the Model "E" a labor saving, one-man unit. Furnished in four lengths to fit any truck chassis. Write for complete details.

For More Profitable Material Spreading—THE HIGHWAY MODEL 'R'



AVAILABLE IN SIZES FROM 8 TO 13 FOOT WIDTHS.

COMPARE THESE TIME AND MATERIAL SAVING FEATURES

- Smooth spreading—no thick and thin spots. Spiral feed roller with agitator-conveyor provides fast even spread. Adjustable feed gate controls thickness. Width is adjustable from one foot to full width of spreader.
- Reversible transmissions permit forward or reverse motion simply by shifting lever.
- Swivel type self-coupling adjustable hitch allows traction wheels to remain in constant contact with ground regardless of position of truck or spreader. Entire unit is balanced for easy hook-up to truck.

*Write for complete details*

SOLD AND DISTRIBUTED BY LEADING CONSTRUCTION EQUIPMENT DEALERS THROUGHOUT THE UNITED STATES, CANADA, AND FOREIGN COUNTRIES

HIGHWAY EQUIPMENT COMPANY, INC.
601 D AVENUE N. W. • CEDAR RAPIDS, IOWA

MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS



A ONE-MAN CREW That Will SAVE MONEY For You

SYNTRON
100% Self-Contained Gasoline Hammer

PAVING BREAKERS

BUSTING concrete — DIGGING clay and shale
CUTTING asphalt — TAMPING backfill

*Write for illustrated folder*

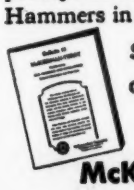
SYNTRON CO., 227 Lexington, Homer City, Pa.



McKiernan-Terry

DOUBLE-ACTING PILE HAMMERS
used 'round the world

Long before the late war these pioneer double-acting pile hammers were the choice for major construction projects as far away as the Orient, Australia, India, as well as Europe and the Americas. Throughout the war, these hammers gave needed aid to Army and Navy construction and reconstruction forces in every theatre of operation .... Today, the greatly expanded facilities of two large, modern McKiernan-Terry manufacturing plants offer contractors prompt deliveries of McKiernan-Terry Double-Acting Pile Hammers in ten standard sizes.



SEND FOR BULLETIN NO. 55

Gives full information, specifications, diagrams, etc., on McKiernan-Terry Double-Acting Pile Hammers and Extractors. Write for it today. MK-1008

McKIERNAN-TERRY CORPORATION
Manufacturing Engineers
19 Park Row New York 7, N. Y.

# Stacker for Aggregate Used at Batch Plant

(Continued from page 6)

the bulldozer's place of handling material between truck and clamshell, according to Plant Superintendent Walt Cody. And the replacement of parts due to terrific wear is not as frequent.

When a truck backed in to this stacker it merely moved over to the proper compartment, received the load, and conveyed to the pile under the clamshell bucket.

A Lima 801 crane, swinging a 1½-cubic-yard clamshell bucket from a 60-foot boom, picked up the clean rock and sand and kept four bins of a 75-ton Conveyco batch plant loaded at all times. On the big days, when pours of 3,200 feet were made, 978 cubic yards of aggregates were handled through the batch plant.

### Rock and Cement Batching

The Conveyco aggregate and bulk-cement batching plants were situated about 3 miles from the Bakersfield end of the project. Six company-owned White batch trucks, hauling four 1⅓-yard batches to the trip, were used under the aggregate plant. A ramp was cut through under the plant so batch trucks could drive through and receive their loads.

Kron dial scales with a Conveyco automatic weigh-checking device were used to proportion the following 1⅓-cubic-yard batch:

| | |
|---|---|
| No. 1 rock (2½-inch maximum) | 1,354 lbs. |
| No. 3 rock (¾-inch maximum) | 406 lbs. |
| No. 2 rock (1½-inch maximum) | 1,038 lbs. |
| Sand | 1,714 lbs. |
| Cement | 627 lbs. |

The Class B concrete was designed for 5 sacks of cement per cubic yard, with a water-cement ratio of 55 pounds per sack of cement. Moisture tests were run at the batch plant, scale weights compensated, and the remaining water needed to mix the concrete to its proper consistency was added at the paver.

Monolith portland cement in bulk, made at the Monolith Portland Cement Co. plant near Tehachapi, Calif., was hauled in by trucks. It was unloaded to a 450-barrel Conveyco cement silo, in addition to a 1,800-barrel silo for storage purposes. The cement, still red-hot from the mill, was picked up from a ground-level hopper and transmitted by a screw feeder to the silo elevator.

Carelessness in dumping big slugs of bulk cement into a feeder hopper can cause the best feeding equipment in the world to plug up, warned Plant Superintendent Walt Cody. By dumping a load of bulk cement gently, never overloading the hopper, it is possible to prevent the messy job of unplugging the screw feeder. Finally, Cody added, cement is still a scarce item and should never under any circumstances be wasted.

Batching usually started at 6:00 a. m., continuing until about 2:30 p. m. After the regular batching period, the stock-piles under the stacker were replenished, and the batch-plant bins filled for the next day's run if there was any question at all as to the material supply.

By integrating batch plant with paver with workmen, by concentrating equipment and man-power 100 per cent on the job, Griffith Co. was on schedule when the job was visited for CONTRACTORS AND ENGINEERS MONTHLY. And this unusual project with its speed and labor-saving devices promised to be one of the most efficient of a likely-looking 1947 road-building season.

## Eye-Safety Goggles

Eye-safety goggles designed for protection against fine dust particles and powder are now available from the American Optical Co., Southbridge, Mass. The lenses are set in a leather mask edged with corduroy to give a tight comfortable fit.

The ventilators around the eyecups are built up with a 150-mesh wire screen set behind a 16-mesh wire screen. It is said that sparks and flying objects will not penetrate this screen. Optional lenses are Super Armorplate, 6-curve Super Armorplate clear, or Calobar lenses in medium, dark, or extra-dark shades.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33.

## Link-Belt D. C. Office

A sales office for the Link-Belt Co. has been re-established in Washington 1, D. C., at 1009 Washington Gas Light Bldg., 11th and H Sts., N. W. It will be under the direction of C. R. (Pete) Heller, the company's Washington representative.

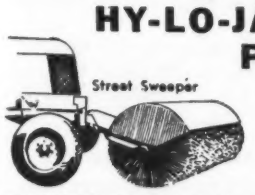
Mr. Heller's duties will be confined to work with foreign purchasing commissions and with the Governmental and Armed Service bureaus located in the District. Industrial sales in the District of Columbia will continue to be handled by the company's office in Baltimore.


Let HYDRAULICS lift your equipment

use the MONARCH

HY-LO-JACK FAN BELT DRIVEN

POWER HYDRAULIC CONTROL




Lifts equipment ten times faster than hand pump. Easy installation on new or existing equipment. Hundreds of applications, such as Snow Plows, Sweepers, Power Mowers, etc. Priced for the most conservative budget.

WRITE FOR CIRCULAR 11.75

"QUALITY MACHINERY SINCE 1856"

MONARCH ROAD MACHINERY COMPANY. 327-329 Front Ave., N.W., Grand Rapids 4, Michigan

Driver's eye view from highway official's inspection car, of a Bitucote Stabilized Road (before seal coat application). Between Edinburgh and Warren, Ark.

Close-up of non-skid surface showing stabilized local aggregate before seal coat was applied.

Bitucote EMULSIFIED ASPHALT MEETS RIGID REQUIREMENTS

A uniform stretch of rugged, non-skid hard surface highway, resistant to corrugating — and free from bleeding and softening at high temperatures.

Bitucote Emulsified Asphalt is applied — from base stabilization to seal coat — *without heating.* Adaptable to local equipment and used with local aggregates.

Bitucote PRODUCTS CO.

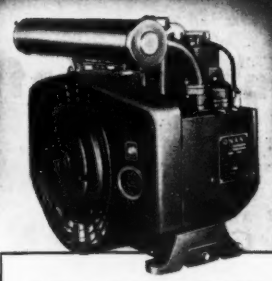
*Write, wire or telephone your inquiries and requirements.*

CAMDEN, N. J. • CINCINNATI, OHIO
ELDORADO, ARK. • ST. LOUIS, MO.

1414 Central Industrial Drive St. Louis 10, Mo.

SMOOTH POWER Two-Cylinder

The NEW ONAN AIR-COOLED 10 H.P. 4 CYCLE "CK" ENGINE



A new, light, compact, easily-installed engine of wide power range. Completely "De Luxe" equipped, easy-to-get-at controls, and many other *plus* points. Prompt delivery on early orders.

ONAN ELECTRIC PLANTS—A.C.—350 to 35,000 watts in standard voltages and frequencies; D.C.—600 to 10,000 watts, 115 and 230 volts. Battery chargers—500 to 6,000 watts, 6, 12, 24, 32 and 115 volts. ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 h.p.; BH: 2-cylinder opposed, 5.5 h.p.; 18: 1-cylinder, 2.5 h.p.

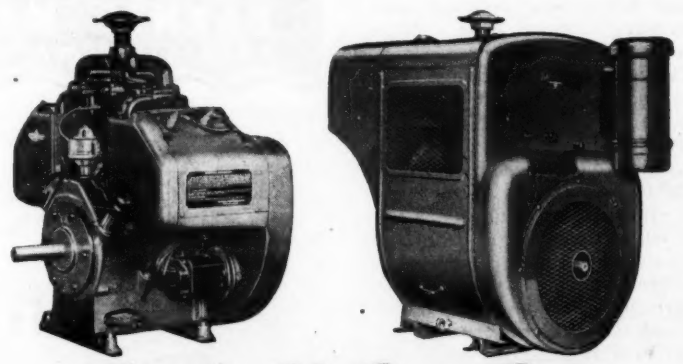
Onan PRODUCTS

WRITE FOR SPECIFICATIONS

D. W. ONAN & SONS INC.
3472 Royalston Ave. Minneapolis 5, Minn.

- HEAVY-DUTY CONSTRUCTION: Short, sturdy crankshaft. Extra-large bearings.
- SMOOTH POWER: Opposed 2-cylinder design. Fully counter-balanced crankshaft.
- SUPER COOLING: Axial-flow fan delivers 600 cu. ft. of cool air per minute. Larger fin area.
- ALUMINUM CONSTRUCTION: High-strength aluminum castings reduce weight.
- ELECTRIC STARTING AVAILABLE: Built-in electric push-button or automatic starting.
- COMPACT, LIGHT WEIGHT: Fits into 15 x 19 x 18 inch space. Weighs only 97 pounds.

ONAN 4-Cycle ENGINES



Let this 20-Horse Team Handle Your Heavy-Duty Power Jobs

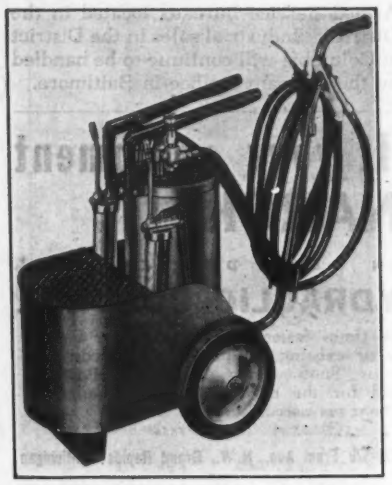
Turning up 20.5 hp. at 2200 R.P.M. the Model VE-4 WISCONSIN Standard Air-Cooled Engine (left) and the Model VE-4 Complete Power Unit (right), can always be depended upon for continuous, heavy-duty operation in any kind of service, on any kind of equipment within their power range.

Positive, trouble-free AIR-COOLING; dynamically balanced crankshaft mounted on tapered roller bearings, *front* and *rear;* extra-long connecting rods; light weight pistons . . . these are features that you can bank on for top performance.

*Specify Wisconsin Air-Cooled Engines for YOUR equipment . . . for most hp.-hours of service, at the lowest overall cost.*

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy Duty Air-Cooled Engines

BUY *all the Bonds you can* . . . KEEP *all the Bonds you buy*



The Graco Lube Service cart carries a supply of four different lubricants right to the machine.

## A New Service Cart Holds 4 Lubricants

A lubrication department on wheels is the description given its new service cart by the Industrial Division of the Gray Co., Inc., Graco Square, Minneapolis 13, Minn. The Graco Lube Service cart carries a supply of four different lubricants (two greases and two oils); it needs no air or electric connections.

Mounted on two semi-pneumatic tires, it is one-man-operated. Accessories include two 1-pound lever guns and one ½-pint pistol oiler. The pressure lubricant pump has a built-in gun loader for hand guns. Grease and oil compartments are filled without removing pumps. The front section of the cart has a large tool box, with hinged lid, which also serves as a platform step for the operator to reach high bearings.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.

## Critics Corner Closed; Sidewalk Supers Mourn

Watching other people work has a fascination that is never outgrown. The same small boy who looks on wide-eyed while his mother makes a pie, can be found 25 years later watching the excavation for a new building with traffic-ignoring concentration. Such curiosity is usually hard to measure, but in Boston where the Turner Construction Co. is building a 26-story addition to the John Hancock Mutual Life Insurance Co.'s home office building, a count was kept of those who stopped to stare. In eleven months 135,000 persons came to watch operations.

The Critics Corner for the Convenience of Construction Connoisseurs has just been torn down to make way for the erection of the steel framework of the building. In its life span of almost one year it satisfied, safely, the curiosity of people who came to watch a major modern engineering and construction project. Some of the regular visitors even had reserved seats with their names painted on them.

## Repairs for Castings

A service for the repair of cracked and broken castings and machine parts of ferrous and non-ferrous metals has been developed by the Metalock Casting Repair Service, 36-15 48th Avenue, Long Island City 1, N. Y. The repairs are accomplished by cold working or deformation of special materials, and are done by trained and selected operators. This service can be applied to diesel or gasoline-engine cylinder heads or blocks, compressors, drilling rigs, marine equipment, boilers, etc.

The repair service is based on four primary techniques. Metalock is the term used to describe specially formed locks or keys made of special alloys and inlaid by cold working into the parent metal. Masterlock is the term used to describe a method of repair using an inlay of high-strength alloy plate held in place by dowels cold-worked into matching half holes between the parent metal and the lock. Interlock is a variation of the Masterlock in which holes of various designs are cut into the plate. Metalace is a term used to designate the method of sealing cracks against leakage.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 73.

## Sales Heads in Midwest

Three new sales managers have been appointed by the Universal Atlas Cement Co. of New York. David S. Day will be Sales Manager at Duluth, Minn.; P. L. Bowlin, Sales Manager at Minneapolis, Minn.; and Patrick F. Morrissey, District Sales Manager, Des Moines, Iowa.

## A Correction

A patented tool for cutting wire rope was incorrectly described in the April issue of CONTRACTORS AND ENGINEERS MONTHLY as being manufactured by Montgomery & Co., 53 Park Place, New York City. This wire-rope cutter is manufactured by the Morse-Starrett Products Co., 1204 49th Avenue, Oakland 1, Calif., the patent owner, and distributed by worldwide dealers, among whom is Montgomery & Co., Inc.

The Morse-Starrett cutter is manufactured in three sizes, the largest with a capacity of cutting wire rope up to 1½ inches in diameter. Its cutting dies and blade are especially designed to retain the original shape of the cut wire rope. The company also manufactures the wire-rope bands designed for optional use with the cutter. The bands are easily applied and are an effective seizing for the wire-rope ends during and after the cut.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 55.

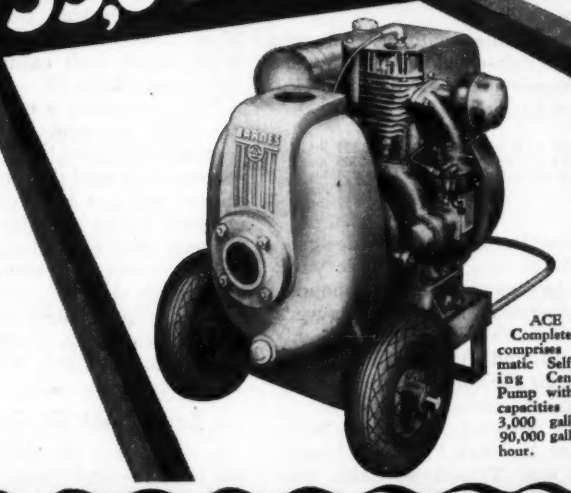
The Morse-Starrett wire-rope cutter.


STREAMLUXE Barnes LINE

Controlled Quality from Start to Finish — that's BARNES "33,000 for 1" PUMPS

Quality Control from raw materials to finally assembled pumps, makes certain that only perfect materials and workmanship go into Barnes "33,000 for 1" Pumps. Under Barnes Quality Control, extra precautionary measures of material selection and testing are combined with precision machining and expert workmanship to produce a pump that delivers the most for your pumping dollar. As a final step, each pump large and small, is factory tested at various heads — to prove this performance. The result is a pump which is the first choice, every time, of men who know pumps and the business of pumping.

For sale by leading distributors in all principal cities. If there is no distributor near you, write, phone or wire.



ACE (20M) Complete line comprises Automatic Self-Priming Centrifugal Pump with rated capacities from—3,000 gallons to 90,000 gallons per hour.

BARNES MANUFACTURING CO. Mansfield, Ohio
PRECISION WATER CONTROL PRODUCTS FOR OVER FIFTY YEARS

this sheeting paid off at 100 to 1

This is how costs were cut and the trenching work speeded on an extensive sewer construction program. ARMCO Steel Sheeting was specified and the contractor reused it *more than 100 times.*

The small displacement area of ARMCO Sheeting makes it easy to drive — easy to pull. Corrugated design assures ample strength yet keeps weight down to facilitate handling and speed installation. In driving, sections butt together or are held securely in place by continuous interlocking joints that assure correct alignment and practical water-tightness.

You'll find other economies in ARMCO Sheeting, too. It is low in first cost for you buy only the exact weight you need. And since the sheeting is nestable it requires relatively little space for shipment and storage.

Write us for prices and detailed information on specific jobs. Armco Drainage & Metal Products, Inc., and Associated Companies, 315 Curtis Street, Middletown, Ohio.

ARMCO STEEL SHEETING

## New Training School For Diesel Mechanics

The Detroit Diesel Engine Division of General Motors Corp. has set up a school in its Detroit factory for training mechanics to operate and service the Series 71 engine. Students consist of the service personnel of Detroit Diesel distributors and dealers, and factory employees of manufacturers who use the GM diesel Series 71 engine in various types of contractors' equipment.

Classes of twelve students are scheduled every two weeks, depending upon the number of applications received for the course. Enrollment is limited in order to give personalized instruction.

This instruction includes both theoretical studies and direct application of principles involved. Students are required to tear down completely and reassemble the Series 71 engines. Principal subassemblies are taken to laboratories for analysis and repair. Here they are taught how to diagnose trouble spots and what service procedure to follow in correcting them.

## New Conn. Commissioner

William J. Cox retired from the post of Commissioner of the Connecticut State Highway Department on June 30. He will reside in Leesburg, Va.

His successor is Dr. G. Albert Hill, former Head of the Chemistry Department, Wesleyan University. Dr. Hill has long taken an active interest in highway traffic and safety in the state.

## Sales Head for All-State

Richard T. Spear is the new Regional Sales Manager for All-State Welding Alloys Co., Inc., White Plains, N. Y. His territory includes eastern Pennsylvania, south New Jersey, Virginia, West Virginia, Delaware, Maryland, and the District of Columbia.

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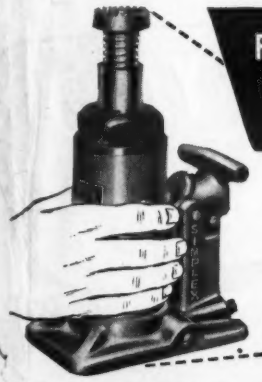

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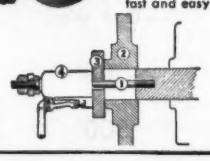

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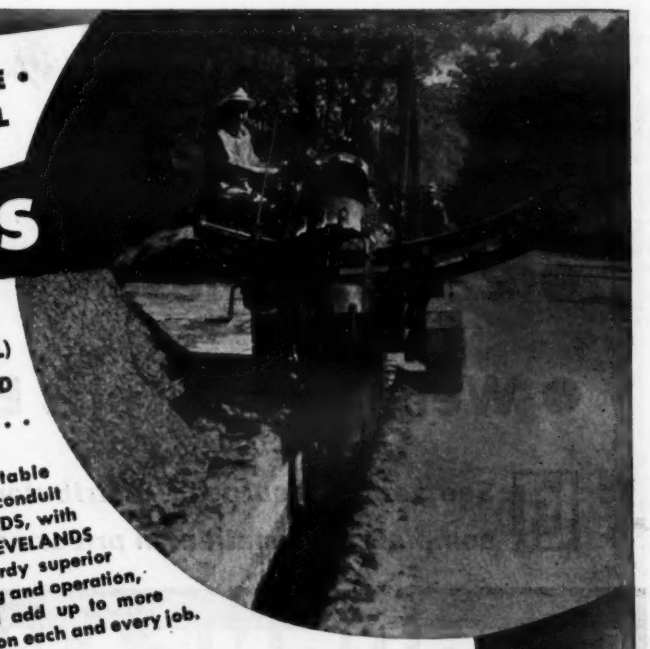

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